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FIRST AERONAUTICAL WEEKLY IN THE WORLD: FOUNDED 1909

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IN THIS ISSUE

Outer Space Before the U.N. 88
Argosy Airborne 89
Bristol Brains Trust 90
Redecorating the Front Office 91
Pre-built 93
The U.S. Industry's Year 96
Fauvette 97
Cold Lake 98
No. 112 (Fighter) Squadron 100
The Record-breaking Rotodyne 102
Radio Distress Beacon 105
New Shapes under Rotary Wings 107

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Opportunity for Action

"IN the long term, the best hope of success lies in the civil field." The words are those of Mr. W. J. Taylor, Parliamentary Secretary to the Ministry of Supply, speaking of the future of the British aircraft industry in the recent House of Commons debate on that subject.

It is our inclination to award him ten out of ten for that statement; but by the same token the Government should receive nought out of ten for the way in which they are meeting—or failing to meet—the implications of the remark.

The future of the industry is, indeed, largely a civil future, even when due allowance is made for the work likely to result from contracts for TSR.2, the new R.A.F. attack aircraft. The current dispersal of design staffs and skilled workpeople, and the emptying of shop floors, can be checked only by a boom in civil orders. If there is no boom, Britain's potentially most valuable technology will atrophy. Ironically, the peoples of the world can now look forward as never before to a future of peace and material prosperity, in which the demand for air travel could be immense. And upon demand for air travel—that is to say, the numbers of passengers and goods-shippers flowing to the airline ticket-desks—depends the number of aeroplanes flowing from the factories of our valuable national engineering asset.

The airlines are not necessarily the best advocates of what is best for themselves or the public. Yet we still have no unified national air transport policy embodied in an expert executive authority that can guide, foster and, when necessary, direct our air transport industry into the pursuit of wise economic policies. We have nothing to compare with America's Civil Aeronautics Board or Canada's Air Transport Board. Our airlines have no *executive* authority to help create the demand which could assure the civil aircraft future. No new committees are needed: it should be possible to expand and give executive power to the Air Transport Advisory Council.

Great Britain's political bargaining powers are second only to those of America, and we have men wise and temperate enough to use these powers to influence the whole air transport world.

Equipping Cinderella

IT looks as though R.A.F. Transport Command is in for a happy new year. The first Bristol Britannia 253 (for No. 99 Sqn.) has taken the air at Belfast, the Minister of Defence has authorized an increase in the Command's carrying capacity and the adoption of AW.660s, and the first Argosy has successfully flown at Bitteswell. Thus when Air Marshal Sir Denis Barnett takes over from Sir Andrew McKee in May as A.O.C-in-C. he will have under his direction a transport arm potentially more muscular and flexible than any the R.A.F. has previously possessed. This is not to say that all is as well as can be, and that Transport Command is no longer a Cinderella. The Britannias will reinforce the Comets on fast long-range operations, and the AW.660s will supplement the Beverleys. What is still needed is a faster and longer-range heavy freighter. We hope that the phrase "an expansion of carrying capacity" signifies a further Government intention in that direction.

C.A.S. GOES EAST: Marshal of the R.A.F. Sir Dermot Boyle, Chief of the Air Staff, about to board his Canberra B.6 at Bassingbourn last Saturday before taking off on a 20,000-mile tour of R.A.F. units overseas *(see Service Aviation, p. 116)*

Avro's New Airliner

FOR at least a year there have been reports, mainly from airline sources, that A. V. Roe and Co. Ltd. have been testing market reactions to a twin-turboprop passenger/cargo aircraft. It was announced last week, on January 9, that the firm has been given the go-ahead by the parent Hawker Siddeley Group to develop this aircraft, which is designated Avro 748. It will be a private venture. The decision was made as soon as it became known that the R.A.F. was to adopt the AW.660, the military derivative of the Group's other civil project, the AW.650.

No details of the 748 are available, except that it will be a 36/44-seater pressurized machine powered by two R-R. Dart RDa.6s. Target for the first flight is "early next year." Sir Roy Dobson, managing director of the Hawker Siddeley Group, said last week: "We have been considering the potential market, home and overseas, for this type of airliner for quite some time, and we have already done a great deal of preliminary work on the project. . . . We believe there is a market all over the world for this small British airliner."

The powerplant and capacity of the 748 suggest that the aircraft will compete directly with the Fokker/Fairchild Friendship and the Handley Page Dart Herald. That a third contestant should now enter the twin-Dart DC-3-replacement field is evidence of the large potential size of this business over the next decade or two. During this time about 1,600 DC-3s in scheduled service will be in need of replacement. Taking traffic growth into account, it is possible to foresee a market of perhaps 2,000 aircraft between now and the seventies. So far only about 130 Friendships (74 Fairchild, 57 Fokker) have been ordered.

The 748 will differ in several important technical respects from its competitors. It is possible that rear-loading will be incorporated and, unlike the Friendship and Herald, the 748 will be a low-wing design. The initial Hawker Siddeley investment in the 748 is reportedly about £2 million, but the cost price is expected to be below the competitive figure of £200,000.

English Electric Aviation

A NEW wholly owned subsidiary, English Electric Aviation Ltd., has been formed by the English Electric Co. Ltd. It will take over the main company's research, design and development on manned aircraft and guided weapons and will handle all future contracts for those products of the English Electric Group.

The new company, which will have an authorized capital of £6m, comprises the aircraft division (centred at Warton aerodrome, near Preston, Lancs) and the guided weapons division (at Stevenage, Herts, and Luton, Beds). Mr. H. G. Nelson is chairman and managing director and Lord Caldecote deputy managing director. Also on the Board are Sir George Nelson and Sir John Woods, together with Sir Conrad Collier (chief executive of the guided weapons division) and Mr. F. W. Page, who becomes chief executive of the aircraft division.

Towards Manned Orbit

A CONTRACT for the construction of the first U.S. manned satellite has been awarded by the National Aeronautics and Space Administration to McDonnell Aircraft Corp. of St. Louis. Intended to remain in orbit for up to 24 hours at an altitude of 100-150 miles, the capsule is reportedly to be launched as the nose cone of an Atlas-D ICBM. The programme is expected to take at least two years and to cost some $15m (about £5,350,000). Tenders from 12 companies were received by December 4, 1958, and the announcement of the McDonnell contract was made on January 12. The capsule will incorporate retro-rockets for deceleration, and a heavy metal shield to absorb or radiate the aerodynamic heat of re-entry, parachutes and an inflatable rubber landing bag.

FROM ALL QUARTERS

Space Rocket Details

STATEMENTS that the Soviet rocket launched into solar orbit on January 2 was a guided missile, was the first such Russian attempt, and was not aimed directly at the Moon, were made in the Soviet Union during the ten days following the launching. Information released included the fact that the rocket carried a jettisonable nose-cone and an automatic guidance system.

A January 5 statement that radio contact with the rocket was lost (at 7 a.m. G.M.T. on January 5) 62 hours after launching gave the exact launching time—not previously announced—as 5 p.m. G.M.T. on January 2. A revised calculation of the period of orbit around the Sun was given as 450 days. At a Press conference in Moscow on January 6, Academician Anatoly Blagonravov was asked whether the rocket was a guided missile. He said that it was, and went on to emphasize that the object of firing the rocket had not been to hit the Moon. Asked whether the launching had been preceded by unsuccessful attempts, he said it had not.

The Estonian scientist Gustave Naan was reported by Tass as saying that a rocket similar to the first Soviet space rocket could be launched towards Mars "if its payload was pared off." Other statements reported that distinct photographs of the rocket's sodium flare had been taken in Georgia and the Northern Caucasus at the precise time predicted for the flare.

On Monday last, January 12, a detailed report on the rocket was given in the Communist party newspaper *Pravda*. This stated that the instrument container had been protected against heat by a jettisonable cone; the final stage of the rocket, in which the container was located, also contained scientific and radio apparatus; and the rocket was guided by an automatic system. The instrument container was to have been separated from the final stage when the rocket propulsion ceased.

Fifty Years in the Industry

ON January 13, knights of the air Sir Thomas Sopwith, Sir Geoffrey de Havilland, Sir Roy Dobson and Sir Alan Cobham, paid their tribute to a man who has built and kept aircraft flying for the last half century. He is Mr. Herbert Woodhams, managing director of Sir W. G. Armstrong Whitworth Aircraft, whose Argosy made its maiden flight last week.

As a boy of 17, Mr. Woodhams watched A. V. Roe's early struggles to get airborne at Brooklands, while he was making parts for a triplane built by Mr. E. V. Hammond (although he left the

BOARD MEMBERS of English Electric Aviation, the new company whose formation is recorded above: Left to right, Mr. H. G. Nelson (chairman and managing director), Lord Caldecote (deputy managing director), Sir George Nelson, Sir John Woods, Sir Conrad Collier and Mr. F. W. Page

TITANIC TRANSPORTER: Taken recently at the Denver division of The Martin Co., this photograph shows the first ICBM to be airlifted. A two-stage Titan, the giant missile was flown by this Douglas C-133 Cargomaster to the missile test centre at Cape Canaveral earlier this month

aircraft engineering 25 years ago, Mr. Hammond is still working in London and is an occasional contributor to our correspondence columns). In 1919 Mr. Woodhams became the first man in Britain to hold a ground engineer's licence for aero engines. In 1923 he was Sir Alan Cobham's engineer on a 12,000-mile trip round the Mediterranean. His toolkit consisted of a spare set of valves and valve springs, a pair of pliers, grinding paste, copper wire and a tube of Seccotine—and they made it.

On the night of the celebration Armstrong Whitworth's directors and senior staff presented Mr. Woodhams with a bound volume recalling his life in aviation. It contains many original letters from famous men of aviation, including one from former Minister of Aircraft Production Lord Beaverbrook, who wrote during the war congratulating Mr. Woodhams for consistently beating aircraft production targets.

Sir Geoffrey de Havilland and Sir Alan Cobham recorded their tributes on tape, and another recording was flown in from veteran flier—and former King's Cup winner—Frank Courtney, who (at Convair, San Diego, California) is still in the aviation business.

Wilfrid Broadbent Retires

ONE of the original members of the Board of the Fairey Aviation Co. Ltd., and with 42 years' unbroken service to his credit, Mr. Wilfrid Broadbent has now resigned his directorship and retired from business life. His connection with the company (since 1917) has coincided with the growth of the British aircraft industry, and he has been involved in Fairey progress from the days of the F.2 to those of the F.D.2 and Rotodyne.

Mr. Broadbent

Soon after joining the company, at the age of 26, he was appointed works manager and in that position was responsible for the production of all the early Fairey types and the change-over from wood to metal construction. In 1917-18 he planned and supervised the building of the North Hyde Road factory in Hayes (now the company's headquarters), establishing it as the main Fairey production centre when the Clayton Road factory was absorbed.

When in 1929 the company became a public one, Mr. Broadbent was appointed to the Board; then in 1934 he was made a director of the Belgian subsidiary Avions Fairey, haven taken a major part in establishing it three years previously. In 1935, when the Air Ministry expansion programme was launched, he negotiated the purchase of the Willys Overland-Crossley factory at Stockport as Fairey's northern plant, and when Stockport Aviation (another subsidiary) was formed in 1936 he joined the Board.

During the last war Mr. Broadbent again went north, to set up factories at Stockport and Ringway Airport; and after the war he negotiated an agreement for Fairey to buy the Heston works from the Government, then supervised their equipment for missile development and manufacture. He has for several years been the company's representative on the F.B.I. South-East Regional Council and the Engineering Employers' National Federation, and in 1953 and 1954 was president of the Engineering Employers' London Association.

Sud Voltiguer Destroyed

DURING a routine test flight last Friday an explosion—so it is reported—severed one wing of the Turboméca-Bastan-powered Sud Voltigeur. The crash which followed killed test pilot Roger Carpentier and two flight-test observers. Carpentier had a distinguished record of test flying and was the first Frenchman to exceed the speed of sound. He carried out much of the test flying of the Trident and last year twice exceeded the absolute height record then held by the Scorpion Canberra.

D.C.A.S. GOES NORTH: Seen at Manchester after presenting prizes to Avro apprentices is the Deputy Chief of the Air Staff, Air Marshal Sir Geoffrey Tuttle. With him are, left to right, J. A. Kendal (Freddie Bassett Trophy winner), P. E. Hall (504 Club Trophy) and John Wolstencroft (Roy Chadwick Memorial Award)

Mr. L. A. Rumbold

WE record with regret that Mr. Louis Arthur Rumbold, A.M.I.B.E., F.R.S.A., a pioneer in the design and manufacture of aircraft seating and soundproofing and the founder of L. A. Rumbold & Co. Ltd., died last Friday (January 9) at the age of 62.

He served in the R.A.F. during the First World War and it was in 1932 that he founded the company which bears his name and of which he became chairman and managing director. He travelled widely and energetically on its affairs, always by air. A well-built man, he used to say that the best test of his aircraft seats was whether he could sit in them comfortably himself. In the words of a colleague, he was "the mainspring of the whole business—very shrewd, but a lovable character."

IN BRIEF

Sabres of the Danish Air Force squadrons at Aalborg will be the first Danish aircraft to be equipped with Sidewinder missiles.

* * *

Two of the nine West German Air Force fighter/bomber squadrons were placed under NATO command at the beginning of this year.

* * *

U.S.A.F. officials at Wiesbaden, Germany, said on January 9 that the F-102A Delta Dagger would go into service with the U.S. Air Force in Europe "within 60 days."

* * *

A second D.H. Beaver has been purchased by the Snowy Mountains Hydro-electric Authority. Based at Cooma and equipped with a Swiss-made Wild RC8 camera, it will be used to carry out an extensive aerial survey of the Snowy Mountains region of Australia.

* * *

Contracts worth approximately $35m have been awarded by the U.S. Navy to the Sikorsky Aircraft Division of United Aircraft Corporation for further production of the Navy (HSS-1N) and Marine Corps (HUS-1) versions of the S-58 helicopter, together with spares.

* * *

Sir Halford Reddish, a well-known industrialist, is to join the Board of the Hawker Siddeley Group. He is chairman and managing director of the Rugby Portland Cement Co. Ltd. and its subsidiary companies and a director of the Scottish Union and National Insurance Co. (London Board) and other companies.

* * *

Films being shown by Mr. William Courtenay in the library of Londonderry House next Monday evening (January 19) at 6.15 p.m., include a series on R.A.F. operations in Aden and the Middle East and the story of a trip to the International Naval Review on board H.M.S. *Ark Royal*. Admission is restricted to R.Ae.C. members, associates and guests.

* * *

Mr. Gene Murphy, European representative for the World Congress of Flight (to be held at Las Vegas, Nevada, from April 12 to 19), reports that the international character of the event now seems assured: "Avro and Orenda, members of the Hawker Siddeley Group, were the first foreign exhibitors to sign up, immediately followed by Rolls-Royce in England and the Société Nouvelle de Fabrications Aeronautiques in France."

Outer Space Before the U.N.

By JAMES AVERY JOYCE, Ph.D., B.Sc. (London), LL.B., F.R.G.S.

United Nations, New York

AN hour or so before the United Nations closed the final meeting of its Thirteenth Annual Assembly, just before the Christmas holidays, a vote was taken among the 82 member States represented at New York which will, unfortunately, tend to "freeze" the outer-space question for the next twelve months. The item "International Co-operation in the Field of Outer Space" will again appear on the U.N. agenda at the Fourteenth Assembly, next autumn.

As foreshadowed in an article in *Flight* last year* this item formed the subject of a major debate at the recent Assembly. It was initiated by alternative proposals submitted earlier in the year, first, by the Soviet Union and, later, by the United States. The purpose of the present article is briefly to examine those proposals and to record a few of the highlights of the remarkable debate to which they gave rise, both in the Assembly's Political Committee and at its concluding plenary meeting.

Regretful though it may be that this memorable debate did not result in the unanimous decision widely hoped for, it is nevertheless true that the speeches were of an unusually high order and served to clarify the attitudes of the world's governments towards the novel and exciting problems of the Space Age.

As AMBASSADOR MATSUDAIRA of Japan pointed out early in the discussion, in pleading for "a new dimension" in world political and legal concepts: "This age seems to be full of hope, and yet, at the same time, it is fraught with immense danger. To eliminate this danger, we must affirm unequivocably and now our common aim, which is that outer space should be used for peaceful purposes only."

The Soviet Deputy Foreign Minister, VALERIAN A. ZORIN, opened his case by stressing that "the launching by the Soviet Union in October last year of the first artificial Earth satellite has inaugurated a new era in the history of mankind. The scientific and technical task of overcoming gravitation may be regarded as solved. The road to outer space has been opened for mankind." But he introduced an "omnibus" resolution (summarized below) which left little doubt that Soviet policy is to encourage the planning and development of space exploration jointly with other nations under the auspices, directly or indirectly, of the United Nations. This is how he put it: "The Soviet Union is prepared immediately to conclude an agreement calling for the prohibition of the military utilization of cosmic space and the launching of rockets into outer space only in accordance with a co-ordinated and agreed international programme of scientific research. . . . Such an agreement would open the door wide to large-scale international co-operation in the peaceful uses of cosmic space. It would lay the foundation for a joint study by scientists from all countries of the various problems related to the cosmos and interstellar space."

A Soviet Success

This pragmatic approach obviously won favour with most delegations. The fact that the Soviet Union could quite overtly come to the Assembly and, in spite of its own technical lead in space exploration, offer to place its unique experience and equipment at the disposal of the world community, represented both a psychological and diplomatic success for the Russians which has not, it would appear, received its due emphasis in the general press.

The United Kingdom delegate, whose general attitude was charmingly noncommittal, was evidently on the horns of a dilemma. "The machinery envisaged in the Soviet draft," said SIR PIERSON DIXON at one stage, "is too ambitious in the present initial stages of the problem. To set up an Agency would, in fact, be asking the international community to run before it can walk along these uncharted routes. . . . To set up a fresh Agency to deal with outer space, before we have at least some idea of what is involved, would, I am sure, complicate rather than advance matters." Yet a few moments later Sir Pierson was warning his hearers against this very lethargy: "The breakdown of the barriers between mankind and outer space is a capital event in the age-long history of this planet. Let us not make the mistake which mankind has made so often when confronted with a new element or a new field for conquest by human endeavour. . . ."

Nonetheless, it was significant of the refreshing catholicity of the debate, as it developed, that DR. PINOCHET of Chile brought together, almost in the same breath, the initiative of the Russians with the admonition of the Holy Pontiff, when he quoted the July 1958 issue of the Soviet magazine, *USSR*, as asserting that "the joint exploration of space on the part of Soviets and North Americans has in the future great possibilities of combining human knowledge and ability in one great united effort; it is the fervent hope of the Soviet scientists that these possibilities will become a reality." And he immediately cited the late Pope Pius XII, at the Seventh International Astronautical Congress, held in Rome in September 1956, as saying: "The most audacious explorations of space can only serve to introduce a new cause of division between men unless concurrently there is a moral and more profound reflection, and a more conscious attitude regarding the higher interests of humanity."

The Italian delegate, PROFESSOR ANTONIO AMBROSINI of the University of Rome, underlined that the first attempts to reach and explore space had clearly enlisted the consent of all States. "In fact," he said, "tacit and unanimous agreement has obtained between these States in the sense of allowing, during the geophysical year, the launching and circulation of rockets and artificial satellites which practically overflew all the territories of various States without any protest being made on the grounds of violation of sovereignty." Both the U.S.S.R. and, immediately after, the United States, had obtained valuable results in this field.

In turning to "the need to determine the juridical nature of cosmic space and, consequently, the ways, the means, and the possible limits of its utilization," Professor Ambrosini stated that "the closest example at hand with which this topic would seem to a certain degree to converge is aviation, which also is the science and practice of human flight." Nevertheless, he insisted, "the basic problem in this matter, the question of the *sovereignty* of States, may arise in a profoundly different way for conventional aviation, which uses machines that fly only through the air space, than for astronautics, which uses other kinds of machines which do not need air to travel through space." Having noted that, "at the present stage no norms of international law define the legal nature of extra-atmospheric space," he asked the question: "What is or can be the juridical status of these lofty spaces? Can States pretend that their sovereignty projects beyond the air space and consider any part of these cosmic spaces to be part of their territories?"

Such pretensions, continued the speaker, had the grave shortcoming of including within the sovereignty of a State a space which is never fixed or determined and which changes incessantly through the effect of the rotation and revolution of the Earth. "This space would, in fact, have a conic form. Its point would be at the centre of the Earth, and it would rise through the frontiers of a State towards the sky. If we look at the Earth in this light, the result will be a series of cones corresponding to various States, but these cones will be constantly changing their position in space following the movement of the earth."

An Italian Suggestion

The Italian delegation therefore urged the Assembly: (1) To request all States to postpone the termination of the Geophysical Year, until the Committee mentioned below should have submitted its recommendations to the Assembly. (2) To set up, as the U.S. delegation had proposed, an *ad hoc* committee to undertake the necessary study and recommend special measures to guarantee that outer space would be used only for the benefit of all humanity. (3) To charge this committee with the study of the juridical problems regarding the exploration and utilization of outer space. (4) To recommend that this committee work in close co-operation with other organs directly concerned with the problem, such as I.C.A.O. and the International Telecommunications Union.

The Italian view has been stated *in extenso* because it was generally representative of that of the "smaller" nations, who admitted their present economic and financial inability to produce and launch Earth satellites; but who, nevertheless, were vitally concerned that the two Space Powers should not engage in a suicidal "race for space" for thinly-disguised military ends, but should pool their programmes and scientific resources through the U.N. for the common good.

In accepting this prevailing attitude, the U.S. delegate (MR. CABOT LODGE) stressed that "each of us has been struck by the sudden realization that despite all the things that divide us we are all men living together on the same planet and are all affected by these newest triumphs of human ingenuity and labour. The challenge is great and the stakes are certainly high. We can use this new dimension to destroy ourselves through the extension of national rivalries into outer space or we can use this new development as a vehicle for international collaboration and harmony."

So much for the precepts. The practice was quite another thing. An attempt must now be made to explain what happened when the two Space Powers were brought face to face with the need to agree on a common formula of co-operation in space.

As stated above, there were originally two draft resolutions presented to the Assembly. The first was submitted by the Soviet Union on November 7, calling on all U.N. members to conclude an agreement based on the following principles: (1) A ban on the use of cosmic space for military purposes and an undertaking by States to launch rockets into space only under an agreed international programme. (2) Elimination of foreign military bases, primarily in Europe, the Near and Middle East, and North Africa. (3) Establishment of international controls within the United Nations framework. (4) Establishment of a U.N. Agency to work out an international programme for launching intercontinental and space rockets, with the aim of studying cosmic space and supervising the implementation of this programme, and which could continue on a permanent basis the cosmic-space research now being carried on within the framework of the I.G.Y.

Not unnaturally, the reference to "foreign military bases" at once put the fat in the fire. Thereupon, on November 13, the U.S.A. submitted its own draft resolution, supported by 19 other delegations, whereby the Assembly would (1) Establish an *ad hoc* committee on the peaceful uses of outer space, consisting of the representatives of . . . and request it to report to the Fourteenth Session on the following: (a) Activities of the U.N. and of other international bodies relating to the peaceful uses of outer space; (b) programmes of international co-operation which could be undertaken under U.N. auspices; and (c) the nature of the organizational and legal problems which might arise under these programmes. (2) Request the Secretary-General to assist and to recommend other steps within the framework for the peaceful uses of outer space.

It will be observed that *all* parties agreed, in principle, to the U.N. becoming the ultimate instrument for future space research, exploration,

(*Concluded at foot of page 92*)

**August 15, 1958, p. 223: "Law of Space: What Next?" by James Avery Joyce.*

ARGOSY AIRBORNE

—AND THE AW.660 ORDERED

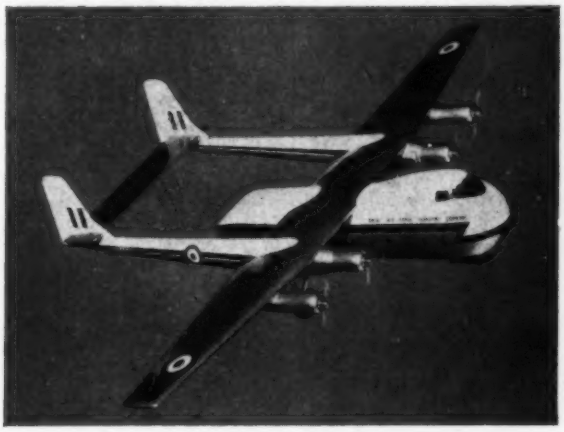
ON January 8, only 28 months from the initiation of the project, the first Armstrong Whitworth AW.650 Argosy (four R-R. Dart 526) flew for the first time, from the maker's airfield at Bitteswell, Leics. This aircraft was the subject of a feature article in our issue of October 17 last. Ten AW.650s, plus two airframes for structural testing, are being manufactured as a private venture, and it is the first of these which has now taken the air.

On board were Eric G. Franklin, chief test pilot; William H. Else, assistant chief test pilot; H. R. Hadley, chief flight development engineer; and Kenneth Oldfield, superintendent of flight sheds. Taxying trials had been completed during the previous week, but Mr. Franklin's decision to lift the big machine off came as a surprise. Six inches of snow had been swept from the runway during the morning, and at noon the flight began. Although the nose was held well down, the Argosy flew itself off after some 2,000ft. The subsequent 62-minute flight was so completely satisfactory that a great deal of actual testing was accomplished, including general handling at various speeds with the gear retracted or extended.

Although no details of the number of aircraft may be given, the decision of the Air Staff to adopt the military AW.660 as a standard tactical machine for R.A.F. Transport Command (p. 116) is particularly timely. The 660 is not merely a slightly revised 650 but a wholly military machine, designed to an R.A.F. specification from the ground up and to be built on a different line at Baginton and Bitteswell. The beaver tail will incorporate a loading ramp and permit heavy dropping. Parachute-troop doors will be provided on either side and the floor will doubtless be stressed for very concentrated loads. It is worth noting that military versions of the Rolls-Royce Dart have ratings up to 3,200 h.p, so power will not restrict the growth-potential of the aircraft.

In service the 660 will probably have a new name. It should prove a versatile and highly efficient vehicle for the carriage of up to 70 fully armed troops, radar vehicles, guided weapons and similar stores, up to a total load of 27,000 lb. It has been stated that two squadrons could transport 1,000 fully equipped infantrymen, together with 80 long tons of bulky stores, to the Middle East in a single night. Both civil and military machines should be ready for delivery in a year's time.

Above is an air-to-air picture of the first AW.650 secured from a two-seat Meteor which acted as chase-plane on the first flight. Below are pictured the crew (left to right, Eric Franklin, W. H. Else, Kenneth Oldfield and Roy Hadley), at the bottom is the take-off and on the right is a model-photograph of the AW.660 in the livery of R.A.F. Transport Command



Bristol Brains Trust

Members of the team, from left to right, were: Dr. A. E. Russell, director and chief engineer, Bristol Aircraft; Lord Brabazon; Sir Arnold Hall, president of the Royal Aeronautical Society and technical director of the Hawker Siddeley Group; Mr. B. S. Shenstone, chief engineer, B.E.A.; A. Cdre. F. R. Banks, director, Bristol Aeroplane Company (Photo. "Western Daily Press," Bristol)

ON Wednesday of last week the Bristol Branch of the Royal Aeronautical Society arranged a Brains Trust, the team compromising the distinguished men above. The question-master, who produced the questions from a sealed envelope, was Mr. Peter Masefield, Bristol Aircraft managing director. The proceedings are summarized here.

What is the future of VTOL? Since we could not look forward to supersonic helicopters, answered Dr. Russell, the future depended on the cleverness of the engine designer. The ducted fan—proposed 12 years ago—would undoubtedly make VTOL possible in economic forms.

Sir Arnold Hall thought that VTOL, though promising, presented "very real safety problems" in a civil application. Runways were "a double-track road to the ends of the earth"; they were an excellent way of getting into the air and an even more excellent way of getting down.

B.E.A.'s VTOL requirement, said Mr. Shenstone, had been merely "something that might be what an airline wants if it wants it." Runways were as "permanent as the Pyramids." A. Cdre. Banks felt safer in forward-propulsion aircraft, and was "sure that a failure with VTOL wouldn't be funny." But Lord Brabazon thought that runways were "getting rather ridiculous"; they should be limited to 2,000 yd, otherwise the whole country would consist of "golf clubs and aerodromes."

What are the essential qualities to look for in choosing the Board of an aircraft company? A. Cdre. Banks thought one needed a good administrator; but that a non-technical administrator "made a bigger mess of things than one with a technical background." Also the job of selling should be done by "everyone from the managing director downwards."

Can Britain develop a supersonic airliner without previous experience of big supersonic aircraft? "No," said Mr. Shenstone, "because the airlines couldn't afford to finance it." A. Cdre. Banks reckoned that two prototypes and production tooling would cost £100 million. Sir Arnold said: "I get worked up when people say we can't do things. We're the best country in the world in engineering and for developing new ideas." Of course Britain could develop a supersonic airliner. He had a growing feeling that it would be an essential element in air transport. One could see the prospect of reasonable airline economics. Technically we could do it, but "make no mistake, it will be exceedingly expensive."

Lord Brabazon thought supersonics "a lot of nonsense." What, he asked, was the great advantage of getting to New York at three in the morning instead of at five? Dr. Russell believed that economic prospects had improved, but "I should hate to see all our money spent on this." There were many other more worthwhile projects. Summing up, Mr. Masefield said. "The serious issue is that if we don't produce one we may have to buy American."

Should Britain launch a space programme? Yes, said Sir Arnold. The Earth satellite was "an exceedingly good instrument of basic research." A great deal could be done on the back of our military development. We would launch smaller satellites but, by developing smaller instruments, we would get results as good as anyone else's. It was noteworthy that our observation equipment had given us far better observations of existing satellites than were obtained by those who launched them. We could do it either by ballistic rockets or by air-launching. Air launching would be cheaper but might require more accurate guidance. A. Cdre. Banks concurred, Lord Brabazon agreed ("just") and Mr. Shenstone also voted in favour.

What was the biggest mistake in the history of aviation? Lord Brabazon considered this to be the Government's war-time decision that the movement of troops was not the R.A.F.'s job, which had left the Americans years ahead in transports. A. Cdre. Banks commented that we had no transport programme because our production had been a 100 per cent war effort, whereas the American production had been 70 per cent war effort. Furthermore, we had a heterogeneous assortment of transport aeroplanes before the war, while the Americans had types like the Boeing 247 and the DC-2. No, the biggest mistake was, he considered, the decision that Britain should do her supersonic research by models dropped from Mosquitoes. "I said at the time that it would put us back ten to 15 years in supersonic fighter development. I think I have just about been proved right."

Mr. Shenstone said he couldn't think of anything worse. Dr. Russell felt that the biggest mistake was made when the Government was led to think that, just because one firm decided to do a civil transport as a private venture, other firms could do so, too. Sir Arnold Hall rejoined: "But we have got an order for it." He thought the biggest mistake was our concept of an airliner as "a thing to get in and stay in, instead of a thing to get in and get out of as quickly as possible." With respect to Lord Brabazon, he continued, the Brabazon approach to air transport—"thick wings and staterooms"—had bedevilled the whole aviation industry.

Lord Brabazon rejoined that his committee had been intended to express users' requirements. There had been two members of B.O.A.C. on the committee. "When the Brabazon was built B.O.A.C. did not want to see it. They took not the slightest interest in it. That was a scandal."

Mr. Masefield summed up the panel's view of aviation's biggest mistake by saying that every section of aviation seemed to have come in for some criticism; but he was surprised that there had been no mention of the Defence White Paper of 1957.

What sort of aircraft is necessary to replace the Convair and Viscount, and how do we go about building it? Mr. Shenstone said that there were two types of Convair and Viscount replacement. Though B.E.A. made mistakes as well as B.O.A.C., it was their view that the first type was the D.H.121. The second type was something smaller for the average airline, something closer to Viscount and Convair capacity—50-60 seats and 1,000 miles' range. Considering the sort of engines being developed now, he thought it unlikely that it would have propellers. The ideal number of engines was, he thought, two, though the engineer did not always have a say in this. The salesmen might have the last word, since they had been selling four-engined travel for so long. This was merely because their airline operated four-engined aircraft, and "it is very difficult to eat one's words overnight." The smaller airliner might be ideal for the average airline, though not necessarily for B.E.A. Therefore the only alternative was Government support or some assistance to an airline to make the thing a going concern. "Otherwise another country will do it."

Lord Brabazon agreed that an inter-urban machine of 50 passengers was needed, "not these transatlantic prestige-liners" which were all right for prestige but "not if you wanted the bullion." We had heard about ducted fans for 12 years, he added, but we had never seen one. A. Cdre. Banks said that Britain did a ducted fan in 1945, but no one had been interested in it until the last few months. Sir Arnold Hall thought we needed another Brabazon committee. The Government must know that it was wise to support new aircraft, but they didn't know what to support. Such a committee might sway the Government, who were being rather difficult. He hoped that Lord Brabazon would be in the chair.

Dr. Russell thought there was no longer any jet versus turboprop controversy. The future was in the ducted fan, which combined the advantages of the two. It might be possible to replace the Viscount by something which flew twice as fast, and "around 60 seats seems about right." Neither B.E.A. nor B.O.A.C. was responsible for the future of the aircraft industry, which would welcome the reconstitution of the Brabazon Committee under its original chairman. Unless someone supported the aircraft under discussion we should look back on *this* as our biggest mistake.

Mr. Masefield considered that some useful propaganda had been contained in the team's answers, and Mr. Shenstone's points had been noted.

The final question, on the R.34 memorial, drew a remark from Mr. Shenstone—it met with unanimous approval—that though memorials which portrayed actual aeroplanes tended to date and become curiosities, the airship would never be developed further. It thus seemed to him that the most appropriate memorial would take the form of an airship, which was a thing of beauty in itself.

Redecorating the Front Office

B.A.L.P.A. DISCUSS COCKPIT FURNISHING

DECLARE a colloquium, put together pilots, test pilots and engineering representatives of manufacturers, and out of the hubble-bubble of technical shop and human nature the same two general conclusions always seem to emerge: manufacturers can provide anything a pilot wants ("if *only* you'd told us"); and pilots are always dissatisfied with what has been provided.

Pilots, particularly airline and Service (test pilots are a special case; their loyalties are divided), have always had a reputation for speaking bluntly. On the subject of their own special province, the flight deck, discussed recently at the British Air Line Pilots Association "Flight Deck Forum," they were very blunt indeed.

CAPT. PETER BRESSEY started by declaring that the cockpits of British civil aircraft now in service were "cramped, uncomfortable, noisy, draughty, dirty and downright dangerous."

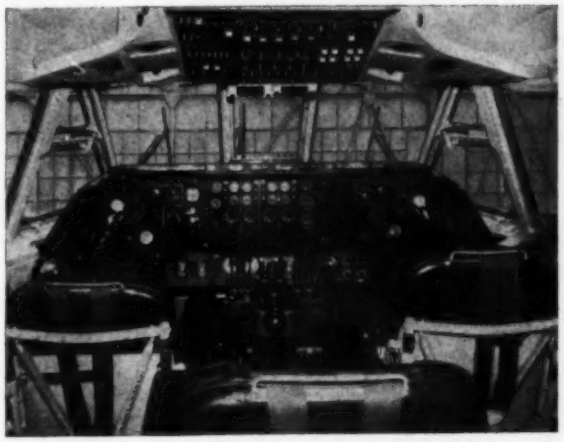
The cockpit, he said, was simply the pilot's office, which he shared with other people to help him in his job. What company would think of putting any ground staff into an office where there were holes in the floor (which was above the machine shop) and where you ate at your desk, you were not allowed a teaspoon because it was dangerous, and you had better not drop your knife or your coffee? What other office would place a 3kW heater 3ft behind your desk, summer and winter? And (put in CAPT. KIRKLAND, of B.E.A.) you had to remember the fan behind your neck, the stop-valve above your head (a reference to condensation troubles) and the three sets of telephones over your ears. What a nightmare, continued CAPT. BRESSEY, the average cockpit was to clean; any housewife would pale at the thought.

Continuing his attack, he said that for flying modern aircraft he recommended a few extra items of personal kit that were not normally provided. These were (1) a torch, to supplement the instrument lighting; (2) cotton wool, for soundproofing in the only way left to the pilot; (3) a blunt penknife, which could be used with the cotton wool to prevent instrument lamps rotating and thus dazzling the crew; (4) a small Elastoplast, for dimming over-bright warning lights; (5) a clean tea-towel (if forecast O.A.T. was less than −25 deg C) for wiping ice off the windscreen; and (6) a Douglas protractor (if the forecast O.A.T. was less than −35 deg C) for scraping it off.

Nothing could have been better calculated to spice B.A.L.P.A.'s first forum of pilots and manufacturers—convened to discuss the Association's rather cautious official Flight Deck Policy—than this slashing but good-humoured castigation by Capt. Bressey. The printed policy, although the result of much worthy work by B.A.L.P.A.'s technical committee and representing a digest of many pilots' opinions on the layout of a two-crew cockpit, makes rather dull reading. The first paper to be delivered at the Forum was intended to shock; to show that behind these recommendations lay real dissatisfaction with designs that two or three or five years ago were thought to be as good as anything of their kind.

What B.A.L.P.A. are trying to achieve is a major hand in the design of every British cockpit, and the policy is an attempt to provide manufacturers with a set of guiding principles that, if followed, would make easier the task of pilots who are now almost continuously busy. The Association have been hampered in the past by an inability to speak with one voice and, they say, by the indifference of some manufacturers to their suggestions or even to their existence. Of course, they have also had changes of mind, and the forum was an attempt to crystallize policy.

Following his early shock tactics, other suggestions made by Capt. Bressey were that the let-down chart should be better lighted and that intermittently used equipment should not be permanently fixed in position. Weather-radar presentation (which was often retractable) was a good example, but pictorial navigational information was a poor one—it absorbed a lot of space and he suggested that it could be "angle-poised" from the roof. The take-off monitor could be similarly treated. Literature stowage (Aerad charts, etc.) was still inadequate and windscreen wipers ought to be considerably simplified and made easier to start.



Typifying British practice is the Vickers-Armstrongs Vanguard. This is designed for two-crew operation, plus observer and supernumerary

When B.A.L.P.A. had gone to an unspecified firm who were re-entering the civil field after 20 years, said Capt. Bressey, the reaction of the designers had been, "This isn't so very difficult." He thought that test pilots would like the result and that cockpits would be safer as a result of B.A.L.P.A.'s guiding hand.

W/C. WALTER GIBB, chief test pilot of the Bristol Aeroplane Company, read the second paper of the day. Here was a voice to be respected, for a test pilot has a foot in both makers' and users' camps. The manufacturers really do want to please you, he said, but you must not change your mind once you have told us what you think you want. The B.A.L.P.A. Flight Deck Policy completely ignored anything other than two-crew operation, but what about the flight engineer?

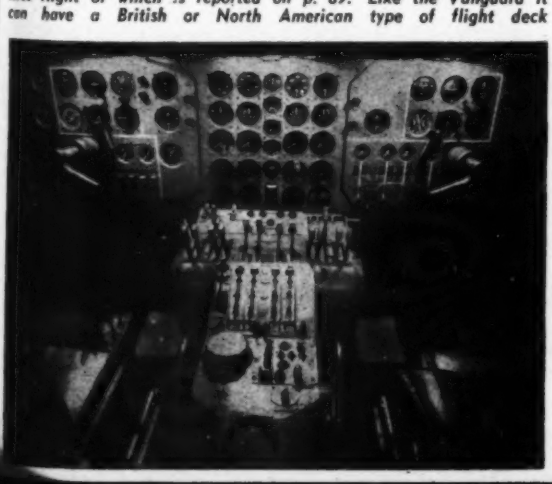
Bristol advocated an engineers' systems panel on the right, and believed that panels should be laid out with line diagrams to show the sequence of operation. His own firm had been using Nesa glass (the only effective remedy for windscreen icing was electric heating) for 6½ years, but they would now never design another aircraft without a separate cockpit air-conditioning system. Condensation was an enormous problem, and even a glass-fibre inner skin with drains hadn't solved all the problems, as the windscreen frames could not be protected without thickening them unduly and obstructing visibility. He went on to ask B.A.L.P.A. what sort of control column they wanted—he favoured one projecting from the instrument panel—and whether they would accept 2in-diameter engine instruments, since panel space was at a premium. Also, he added, "Let us have no more black panels, please, now that grey has been found so effective."

Criticizing detailed points of the printed policy, W/C. Gibb said that, in particular, he was opposed to the suggestion that there should be an intermediate pressure bulkhead between the passengers and the flight deck.

In the open discussions that followed these papers, this recommendation in the policy was bombarded again; in defence, CAPT. R. T. MERRIFIELD, chairman of B.A.L.P.A., and chairman of the forum, asked CAPT. M. W. BROOM (chairman of the technical committee) to explain that it had been included only as a tentative suggestion to test the customer's reaction.

Not all of the recommendations (many of which seemed surprisingly obvious, but which are apparently sometimes overlooked) can be summarized here, but some new ones and some of the more contentious old ones were: that communication and navigation instruments which have to be tuned should not be mounted above the pilot's shoulders; that nosewheel steering should be provided for both pilots; that feathering buttons on turboprops should be placed in between the H.P. and L.P. cocks of each engine; and that controls in a turbojet should be placed from top downwards,

Another new British two-crew transport is the AW.650 Argosy, the first flight of which is reported on p. 89. Like the Vanguard it can have a British or North American type of flight deck



REDECORATING THE FRONT OFFICE . . .

or forward to aft—H.P. cock, L.P. cock, fire button, relight button (a proposal made during the forum was that the relight button should be in the throttle). It was proposed verbally that the number of crew members should depend upon the gross weight of the aircraft; the written policy referred to two-crew operation.

Led by Capt. Kirkland, considerable discussion ensued on the best means of presentation of information on the flight deck. During take-off, he said, the type of information pilots wanted was simply "yes" or "no," instrument scanning becoming more and more cursory as V_1 was approached. Quite strong support was provided for instruments providing quantitive figures, and it was generally agreed that comparison between the needle position of grouped instruments of the same type was an adequate and eye-catching indication of malfunction. Test pilot John Wilson, who with Comet test pilot Peter Bugge represented de Havilland, said that 2in jet-pipe temperature gauges were used on the Sea Vixen and were satisfactory, but Capt. Bressey thought that, even with an enlarged scale, they would be unsatisfactory.

Another pilot with strong opinions was Mr. D. P. Davies of A.R.B. He told the chair that B.A.L.P.A. had only "played with" the details of cockpits and then only for two-crew aeroplanes such as the A.W.650 and Vanguard. But design assistance was needed on big transports which had a crew of three. One of the current troubles with cockpits was that they were designed for a minimum flight crew, but the aeroplane was flown by an operational flight crew. The real errors in cockpit design stemmed from poor liaison between the pilots and the management—that was why in the Viscount 700 the cockpit for T.C.A. was better than that for B.E.A. To Capt. Bressey, Mr. Davies said that in criticizing this particular cockpit he was really criticizing the operator. Operators, constructors and A.R.B. all had a joint responsibility for design.

Mr. Davies then referred to the aircraft in which B.A.L.P.A. had assisted with the cockpit design. It was good, he said, but no better than three other prototypes which he had recently seen.

It is quite clear that the Association was getting exactly the sort of criticisms for which it had hoped and, without pique, Capt. Bressey and Capt. Merrifield replied carefully to the points Mr. Davies had raised. The former admitted that much of what the A.R.B.'s pilot had to say was justified, and agreed that moans by pilots should be sorted out with the operators. It was suggested that the successful designs seen by Mr. Davies might represent the beginning of wisdom and seemed likely to have been requested by operators and hence (indirectly) by pilots. After Capt. C. C. Jackson (I.F.A.L.P.A.) had put the International Association's view that emphasis was now on a three-man crew, with the second pilot trained as an engineer, Capt. Merrifield summed up and closed the meeting by saying that B.A.L.P.A. endorsed three-crew operation as a fail-safe measure.

A. T. P.

G-APOB's GALLANT TRY

IT is now possible to make some further observations on the Atlantic crossing by the balloon/boat *The Small World*, the conclusion of which we briefly reported last week. Manned by a British crew consisting of A. B. ("Bushy") Eiloart and Tim Eiloart, and Colin and Rosemary Mudie, it left the Canary Islands on December 12 and, seaborne, reached Barbados, in the West Indies, on January 5.

By taking advantage of the trade winds the crew hoped to make the first (and only?) balloon crossing of the Atlantic and to break existing world's records (1,719.4 miles for distance and 69 hr 29 min for endurance, by the Russians Nevernov and Gaiguerov in 1941). The car was designed by Colin Mudie—an experienced yachtsman and marine architect—as a sailing vessel in which the voyage could be continued should the balloon descend into the sea.

In the event that was what happened. The craft was airborne for 94½ hr, covering 1,200 miles. Most of this was at a few hundred feet, height being to some extent controlled by the weight of the trail-rope in contact with the surface—an approved ballooning method. Then it met a strong thermal current in a rainstorm and began to suffer the kind of equilibrium trouble familiar to old-time balloonists—a sudden and more or less uncontrollable rise to over 4,000ft, followed by what might have been a catastrophic descent at 20ft/sec. By discharging ballast the crew succeeded in checking the fall just before they reached the surface. The quick-release gear for the balloon worked exactly according to plan and G-APOB then became a sailing boat, in which the rest of the journey was completed in 21 days.

Unofficially the airborne journey had beaten the Russian duration record by some 25 hr, though in the absence of independent verification it cannot be submitted to F.A.I. as a world record.

As was apparent from the article written by Colin Mudie in *Flight* for November 21 last, the adventure had been carefully planned and its risks assessed. A study of the detailed log of the flight published in the *Daily Mail* last week suggests that the primary reasons for the failure of the aeronautical objective were inexperience (only Mr. Eiloart senior had ever before made a balloon ascent) and insufficient development-testing of some of the equipment—notably that for picking up water ballast.

From the same account, it is apparent that the whole crew, and not least its woman member, behaved with admirable coolness and discipline during some very trying moments. Equally praiseworthy was their fortitude, and Mudie's navigational skill, during the ensuing three weeks on the surface, for sailing the Atlantic in a 15ft boat is a formidable adventure at any time.

Firms well known in the aircraft industry were among those contributing to the construction and equipment of *The Small World*. The balloon was made by the R.F.D. Co. Ltd. from I.C.I. Terylene fabric woven by Brook Mill (Leyland) Ltd. and neoprene-coated by the Greengate and Irwell Rubber Co. Ltd.; Boscoprene 2400 (B.P. Chemical Co. Ltd.) was the adhesive for the seam-taping. Hydrogen was supplied by I.C.I. Billingham Division.

Terylene was extensively used for various ropes and sails, and also in the crew safety-harness by the G.Q. Parachute Co. Ltd. The sections of the polystrene car, coated with Terylene fabric woven by Fothergill and Harvey Ltd. were bonded with Araldite (CIBA [A.R.L.] Ltd.). Kelvin & Hughes Ltd. supplied air and marine navigation instruments. Nylon for crew clothing was by British Nylon Spinners Ltd.

Other firms concerned included British Ropes Ltd., Buck & Ryan Ltd., E.M.I. Sales & Services Ltd., T. C. Hayward & Co. Ltd., Hawkins and Tipson Ltd., Lea Bridge Industries Ltd., George Lister & Sons Ltd., Metal Box Co. Ltd., Plastics Group, Phillips Cycles Ltd., Smiths Clock and Watch Division, Luke Turner & Co. Ltd., and "W" Ribbons Ltd.

OUTER SPACE BEFORE THE U.N. (continued from page 88)

control, and development. But, whereas the American side called for, virtually, a year's "study" of the question, the Communist side had teleported the military bases issue into "space" and called specifically for the establishment there and now, of a U.N. Space Agency.

When it became clear, from objections all around the hall, that any resolution linking terrestial bases with space travel would stand no chance of getting anywhere, the Soviet delegation on November 18 astutely submitted a revised version. It dropped the bases question completely, and asked the General Assembly (1) to recommend the establishment within the U.N. framework of an International Committee for co-operation in the *study* of cosmic space for peaceful purposes; and (2) to set up a preparatory group of 11 countries, consisting of the Soviet Union, the U.S.A. and nine others, to report to the Fourteenth Session on all other aspects of its work as outlined in the original resolution.

This was a clever move, for nobody could really reject so altruistic a resolution on political grounds. In fact, many "neutral" and Latin American delegates urged that the U.S. and the U.S.S.R. should get together and produce jointly a form of words which could be passed unanimously. Hope was in the air. Then, on November 21, the U.S. group revised their original 20-Power resolution and incorporated *most* of the Russian points in it, but substituted an 18-Power Committee (with only three Communist countries on it) for the Russians' original 11-Power committee (with *four* of them Communist).

This was where the split ran down to the roots of the world political struggle. In spite of some concessions by the Russians, which pushed up the total of their proposed committee by stages from 11 to 15 members, the Americans would not budge from their 18 Powers and the Russians would not give up their fourth seat. So, in spite of efforts behind the scenes by the "neutrals" a final vote resulted in the Assembly "dividing" outer space on the all-too-familiar Cold War lines and left most of the delegates, who had striven so hard for unanimity, bitterly disappointed.

The final vote in the Assembly was 54 to the nine Communist countries, with 18 abstentions. Thus an *ad hoc* committee is to be set up to "study" the space question in terms of the general principles outlined above, consisting of Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Iran, Italy, Japan, Mexico, Poland, the Soviet Union, Sweden, the United Arab Republic, the United Kingdom and the United States. This committee of ostensibly 18 members is to report to the 1959 Session. But, both before and after the vote was taken, the Russians announced that they would not participate in the work of the committee (and, presumably, this applies equally to the two other Communist countries named and, possibly, also to the three countries appearing on the foregoing list which abstained in the voting). The Americans are left, therefore, with an unrepresentative committee of doubtful value.

Happily for the human race, outside the United Nations, Americans and Russians are apparently co-operating more closely than before on the continuation of the space aspects of the I.G.Y. carried into 1959. The new Committee on Space Research of the Council of Scientific Unions was, in fact, holding its first meeting in London at the very moment when cosmic space was being carved up so vacuously by the political Gold Warriors in New York. The moral of which would seem to be that terrestial politicians rush in where celestial scientists are only just beginning to tread.

PRO-BUILT

Light Aircraft off the Shelf in France and Belgium

By R. G. MOULTON

THE vision of myriad home-built lightplanes busying themselves in daily flight about the skies of France, so commonly imagined by the British aviation enthusiast, is soon dispelled when one travels the length or breadth of that country in search of the sun for a holiday. It is true that the French lightplane movement is the strongest in all Europe, that week-end activity in any of the larger centres is greater than any found among British clubs; but spread as it is from Lille to Perpignan, Dinard to Strasbourg, such activity is lost to the fleeting traveller. Determined to see something of the home-builts on a recent journey through France by car, I returned home with somewhat revised views on the subject—having observed that the home-builts are very much in the minority and are considerably outnumbered by professionally constructed examples of the same aircraft types we generally assume to be amateur-made.

That is not to say that one cannot find exciting and unusual French experiments in any hangar in France. The sight of fascinating aeroplanes ranging from a bubble-hooded two-stroke Lutetia-engined Jodel Bébé F-PGUY to the remote "Avion Gouldou" F-APOZ with low-aspect-ratio constant-chord parasol wing retained by no less than *two* sets of vee struts over a Morane-type fuselage with Loraine radial, always makes a deviation *à l'Aerodrome* well worth while at any large French town.

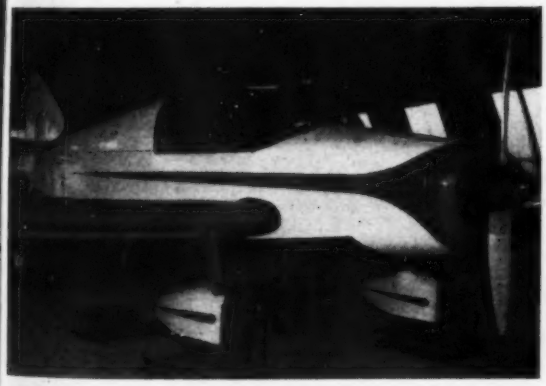
Alas, so few of these experimental types appear to be in airworthy condition and they are usually deposited in the innermost depths of hangars to provide room for the popular club two-seaters of more recent vintage. It would be far from my purpose to decry the magnificent enthusiasm which so obviously prevails among the home-constructors in France, but one soon recognizes the distinguishing quality of the professionally made Jodel or Emeraude. Company trade marks and standard decorative schemes aid one to make such distinction, and observation of week-end activity provides the conclusion that flying time on the home-builts is not only considerably less than that of the pro-built Jodels and Emeraudes, but also a fraction of French lightplane activity. One should not take a single centre as a yardstick, but the largest, at Toussus, had 18 assorted two-seat Jodels outnumbered by 20 Nord 1203 Norécrins, and rivalled in movements by 6 Piper Vagabonds, on a sunny September Sunday. Of the Jodels, 9 were recognizably Normande or Wassmer versions, and the few home-constructed D.112s and D.119s active on the grass runway were engaged in spasmodic *Baptême de l'Air* work. Single-seaters lay dormant in the hangars, and this reflects the coming trend.

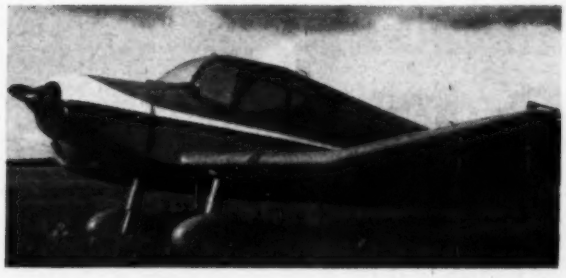
Satisfied by the healthy supply of side-by-side dual control trainer/tourers, the demand now centres on an economic four-seat club machine. Every one of the successful two-seater designers is currently engaged in what amounts to no less than a race to capture the market. Significantly, they all seem to have chosen Lycoming's big flat-four O-360 of 180 h.p. and some six litres capacity. Leading by a long head is Jean Delemontez's D.140 Mousquetaire, now in full-scale production at Lucien Querey's Société Aéronautique Normande factory in Bernay, and the performance of this sleek expanded Jodel is going to set a standard others will find hard to match. Capable of carrying its own weight of 1,200 lb in disposable load at 144 m.p.h. cruising for a range of more than 800 miles, it is stressed to 10 g for two-seater aerobatics (Leon Biancotto has been responsible for flight tests) and has a cavernous baggage compartment which could also double up as a stretcher-case department in ambulance duty.

Where else in the world could one expect to be received as an interested visitor well after dusk at 7.40 p.m. but at Bernay? Hopeful of finding someone at work to confirm a following-day appointment, I found myself on a tour of the works despite the late hour and the fact that overtime was in its closing minutes. No efforts were spared to explain constructional methods or to make photography easy. This without the proprietor to command attention, and all on a purely voluntary basis just out of sheer enthusiasm for aviation and their product by the S.A.N. employees. In one of the three 60ft × 150ft Nissen-style buildings which house the production shops, we found the second prototype Mousquetaire F-BIZA having its cockpit fitted prior to final mating with the lifting surfaces, and who should be doing most of the work but Jean Delemontez himself, assisted by Leon Biancotto and the fitters.

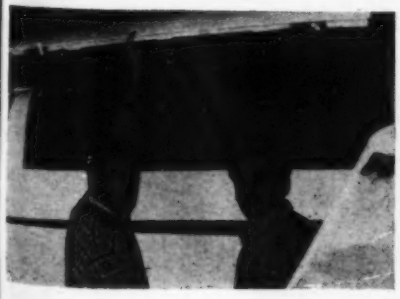
Dressed as ever in his perennial khaki zipper suit and sandals Jean was far from his home at Beaune where we had seen his first roughs of this design three years before, and time was apparently nothing to him in his work seeing the D.140 through initial production stages. Four days later, this same fuselage shell was to be one of the leading aircraft in a fleet of 39 S.A.N. Jodels on a tour of North Africa, Spain and Portugal—a triumphant trouble-free *tour de force* that would have done credit to a far larger plant than the 50-strong factory at Bernay.

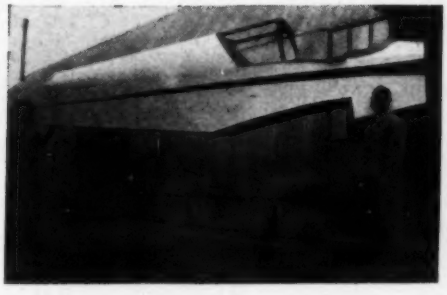
Lucien Querey's own story is one typical of French aviation. Graduating through aeromodelling to gliding, he made his first powered flight on his 17th birthday in 1938. After the war he





Seen at the Bernay plant of S.A.N. were (anti-clockwise from the left) D.140 Mousquetaire being weighed; Leon Biancotto and Jean Delemontez showing capacious D.140 baggage compartment; D.117A fuselage leaving paint-shop; D.140 cockpit; and completed D.117A





Model of the new Wassmer WA.40 displays U.S. influence

PRO-BUILT . . .

gave up a successful garage business to get into flying and in May 1948 opened S.A.N. as a repair shop at Bernay. First he built his own Bernay 101 tandem-wing design—now dismissed as an error of youthfulness—and in 1951 he made his first Jodel Club, No. 41. The idea of making a series of four D-11s for the Continental 65 was realised in 1954 and, from that date on, the tale is of nothing but snowballing progress. Today his total of D.117s alone is over 230, and the production rate has reached nine per month from a staff comprising 25 carpenters, 16 fitters, 4 fabric and upholstery specialists and 5 finishers. Note the accent on finishers, for the S.A.N. Jodel is quite remarkable for its high-gloss mirror surface on fabric-covered wooden surfaces. One cannot help but be impressed by the output *per capita*, or the way in which this so characteristically French design, with its generous dihedral and tip-washout legacies of model experience and the unit construction features for confined space home-building, are turned to advantage for a production line. Spars are made in what is virtually a between-shops passageway, wings and fuselages are taken through to the finished state before mating, and the speed of the operation is such that between photographs of the same fuselage, taken at 9 p.m. one night and 9 a.m. next morning, complete engine installation had taken place.

Two seater D.117A Paris-Tananarive and D.140 Mousquetaire units are jigged in a two-to-one ratio throughout the factory, and each shop is apparently geared to produce a complete turnover from each jig per week. Pneumatic tools speed the process, and sanders are used extensively to give a good base for the S.A.N. finish. Mastic is paletted over madapollam fabric on all ply surface areas, and after this has been pneumatic sanded, mastic is sprayed on to fill again before hand rubbing and varnish sealing takes place. The whole aircraft gets a minimum of four coats of white dope plus the customer's desired trim colour, and as this often covers the wing undersurface, the bottom gets the benefit of an extra coat.

Because the generous dihedral and washout angles of 8 deg each in the D.140 are carried by the enormous Fokker type mono-spar, the whole Jodel design centres around the large 10 × 13in boxed unit, and jigging is arranged so that it is built over the lower booms and bottom facing. Some of the large washout angle over the outer 88in of wing is taken up by the change in section from NACA 23015 on the flat centre bay to 43015 at the aileron and 34b at the extreme tip. The aileron itself has a 2.7 deg twist, all of which must add up to considerable inherent lateral stability.

We asked the man at the bench how long he took to knock out a set of D.117 ribs, as he seemed to have created a small stockpile, and gathered that 2½ days was quite enough for the two-seater. The 8in extra chord and 6ft 6in increased span of the D.140 made a set for that wing take a little longer, but three days was sufficient. How long, then, for a complete D.117 wing? Even recalling that spar and ribs would be ready ex-stock, the three days quoted for three carpenters was much less than the expected answer since there is a lot of leading-edge sheathing, and faster-drying resin glues are only used at condensation points, casein being preferred elsewhere.

To see these so practical Frenchmen at work on their morning shift, one could readily appreciate how 50 of them, some lads under training, can turn out 100 aircraft a year. Elevators, nose ribs and rudder frames are lined up and jigged by that straightest of all jigs—a tight length of string—and all hitherto metal parts calling for panel beating are made outside by glass-fibre specialists, and that includes the engine cowl and the diminutive fin.

Expanded polystyrene lines the cabin for soundproofing, and flock-spray in an attractive red to match the leatherette covered Dunlopillo upholstery adds to the impressive instrument-panel styling to give the D.117 a luxurious, if a trifle tight-fitting, interior. Selling at 2,350,000 francs f.o.b. Le Havre with six-channel VHF, hydraulic brakes, starter and company guarantee for one year, the D.117 Grand Tourisme can usually be identified by its fluted rudder decor. Price in France is higher, at 2,800,000 francs, of which a club can hope to get 950,000 francs in government grant. A three-seater variant, the Ambassadeur, also using the Continental C-90, is available at 2,950,000 francs export price, and the figure for the 4/5 seater Mousquetaire has been announced as 12,000 U.S. dollars for export.*

A lighter version of the Jodel Club using the Continental C-90 is made by Wassmer at Issoire. More than 150 of their D.120 Paris-Nice, and a further 150 of the 65 h.p. D.112 (no starter and selling at 1,650,000 francs) are in service as Club tourer/trainers throughout Europe. Weight is saved by the exclusive use (in France) of Finnish birch ply and there are other interior detail differences. Twenty-channel VHF is supplied, the landing-gear legs have anti-shimmy torque links, fuel is in one tank (approx. 25 gal), there are parking brakes, and the engine has an enormous silencer. Price is 2,320,000 francs for export. The latest innovation in the Wassmer D.120 is its authorization for glider-tug work, provided the glider does not exceed 880 lb loaded and employs a fixed wheel or dolly.

Wassmer's approach to the four-seater market will be revealed in detail soon when first flights have been completed. A well-made model (without exception, every French light-plane designer is also a capable aeromodeller) was shown to us and the departures from traditional Jodel lines in this new WA.40 are strikingly evident. Piper's Comanche (the first European demonstrator arrived at Toussus on April 23 after a Miami-Bermuda-Azores-Lisbon crossing) has obviously impressed, and the manually retractable tricycle undercarriage (by movement of a cockpit lever), all-flying tail, swept vertical surfaces, NACA 63 series airfoil and the pure dihedral, show an American influence which may enhance export sales.

Unlike its counterpart, the Aviamilano Nibbio, the WA.40 will employ fuselage construction of steel tube, but a wooden wing will keep the weight down to about 1,200 lb and permit a 1,000-lb disposable load, including a 40 gal wing tank capacity. Estimated maximum speed is 168 m.p.h. and cruising speed 155 m.p.h. Two bucket seats and a rear bench are included in the model and, since access will be via the large one-piece sliding canopy, there appears to be no requirement for folding seat-backs. The prospects for this bold design are obvious; but it will enter a more pricey field at 6,000,000 francs, and will not be able to compete with the Mousquetaire for at least six months. By that time we may even be hearing of an S.A.N. Jodel twin!

Some of the elegance in fuselage line on the WA.40 reminds one of the delightful Claude Piel C.P. 30 Emeraude, and at Société des Constructions Aéronautiques du Nord at Abbeville we had the pleasure of meeting the designer at work on the board, planning his four-seat aspirant, the Mascaret. This particular design is, at the moment, a reasonably well-kept secret, but the

**On January 1 this year, production of D.117s was transferred from Société Aéronautique Normande to the new factory of Société Alpavia at Tallard Aerodrome, Gap. Alpavia's initial production rate is two per month. S.A.N. at Bernay are now concentrating on D.100 Ambassadeurs and D.140 Mousquetaires.*

Two views of the fuselage of Claude Piel's single-seat version of the C.P. 301A Emeraude at Abbeville. The designer is standing by the cockpit, and in the foreground to the other photograph is a standard Emeraude wing awaiting fabric

Type	Span ft in	Length ft in	Height ft in	Powerplant and t-o. Power	Gross Wt. lb	Disp. Load lb	Seats	Dur. hr	Max. Range miles	Max. Speed m.p.h.	Cruise Speed m.p.h.	Stall Speed m.p.h.	Wing Ldg. lb/sq ft	Take-off ft
Tipsy Nipper ...	19 8	14 9	5 3	Hepu-VW (38 h.p.)	660	300	1	3½	300	95	85	30	7.5	330
Piel C.P.301 Emeraude ...	26 0	20 9	7 4	Continental C.90-14F (90 h.p.)	1,445	629	2	5½	625	128	115	40	12.3	450
Jodel D.117A ...	27 0	20 10	6 8	Continental C.90-14F (90 h.p.)	1,357	600	2	6	720	128	115	31	9.9	394
Jodel D.120 ...	27 0	20 10	6 8	Continental C.90-12F (90 h.p.)	1,430	605	2	6	720	128	115	31	10.5	394
Jodel D.140 ...	33 6	25 10	7 1	Lycoming O360A (180 h.p.) ...	2,400	1,220	4/5	6	806	161	144	41	12.3	688

C.P. 301 from which it will inevitably stem is familiar to British eyes following the September flights of the Scanor Emeraude F-BIRA and the Garland-Bianchi Linnet. Under the direction of M. Gueninchault, the Scanor company is producing a series of Emeraudes, and is also overhauling a few D.H.82a Tiger Moths. An interesting occupant of the large factory area by the banks of the Somme is Claude Piel's personal single-seater, a standard C.P.301A airframe with narrow fuselage and the steel-framed sliding canopy which distinguishes the pro-built from amateur-constructed Piel designs. Though few airframes were passing through the Abbeville shops, the facilities are there for production in quantity, and the quality of workmanship on the wings and fuselages awaiting completion was beyond reproach.

The Scanor company's Emeraude was described in *Flight* of September 5, 1958. This company is only one of the several "small-series" Emeraude production centres, and has yet to get into its stride. It has been estimated that, with additional production by Coopavia and by Rousseau at Dinard, C.P.301 Emeraude delivery should soon reach the figure of 18 per month.

This steady flow of series-production types is also expected to bring the number of lightplanes in France well above 3,200 in 1959. An analysis of the 2,964 aircraft operated by clubs and individuals in 1957 gave the lead to Stampe (503) and Jodel two-seaters (426) and Piper Cub (221). It can be readily understood how 1,380 of those aircraft were flying on American engines. And therein lies the clue to French success in promoting the 65 h.p. and 90 h.p. field. For 1,058 of the U.S.-powered types used the Continental flat-fours with their unique virtues of economy, lightness and cheapness. These engines have lifted the French movement to its enviable present leadership, and the professionally made Jodels and Emeraudes provide new mounts with which to train the constant flow of air enthusiasts.

In the same figures from which the above extracts have been taken, there is also a most significant total of 123 Volkswagen-powered single-seaters, or approximately 4 per cent of the total movement. These in the main are the Jodel Bébé and Druine Turbulents with which we generally associate the term "home-built," and it seems a great pity that their numbers are not expected to swell greatly. The trend to two-seaters has been influenced by the power-unit problem and though the Ardem, Stark, Hepu and other modified aviation Volkswagens are becoming available to meet the power and airworthiness requirements of a 40 b.h.p. unit, the pattern in France has, in my impression, changed just as much as has Henri Mignet's individual swerve over the years from 20 to 90 horses.

In Belgium, however, the single-seater has always rested in Ernest Oscar Tips' mind as the means to get the impecunious enthusiast into the air, and in his 66th design, the Nipper, he has combined practical simplicity with a performance and a price that should meet the demand. The problem is going to be to raise the demand, for no matter how attractive this *Joujou de l'air* will be from so many points of view, the cost of getting a private pilot's licence still remains the main stumbling block for those without Service training or similar facility to short-cut the expensive training hours.

Four years of serious study preceeded the first flight of OO-NIP, the Nipper prototype, and the six airframes passing through the assembly shop at Avions Fairey at Gosselies are the subject of what is probably the most intensive technical examination ever made on an ultra-light. All are to be registered in the NI series and No. 2, the first to have the enlarged fuselage with canopy, and the two-piece wing, is registered OO-NIX. At the time of my visit it was fitted with a single-ignition Hepu-Volkswagen of 38 b.h.p. and the instrumentation for temperature and other checks served to show how serious is M. Tips' intention to market a thoroughly tested machine. Wool tufts covered the centre-section and aileron areas, a selection of propellers was ranged upon the hangar wall, and temporary metal fairings and control surface extensions gave NIX a truly professional prototype appearance.

Simplicity has been the keynote. Manufactured to a standard of performance at an attractively economic price, the car-engined single-seater may yet become the popular flyabout M. Tips has sought so often to provide. The kit, which includes finished steel-tube fuselage frame, nosewheel undercarriage with specially made lightweight wheels and disc brakes, all other metal parts fabricated, adequately prepared wooden parts for the flying surfaces, and a packing crate that also serves for assembly jigs, is to cost £375 ex Gosselies.

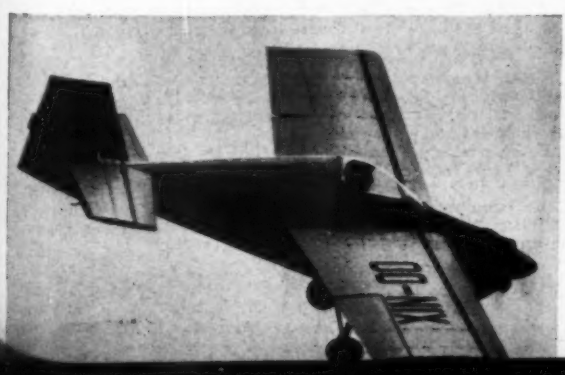
This leaves the choice of engine, instruments and propeller to the constructor, but M. Tips' advice will be readily given, and whether single- or dual-ignition Volkswagen engines are chosen, performance tests from factory machines will provide information to help the enthusiast in his choice. Next in the development programme is a test of the self-starter equipped dual-ignition Stark-Stamo Volkswagen for which 45 b.h.p. is claimed, and the Italian MV Augusta unit is another two-cylinder engine meeting the installed weight limitation of 125 lb. The completely finished aircraft, fitted with the 40 h.p. Hepu, will sell at £1,000 ex Gosselies.

Such is the enthusiasm of this Belgian factory for its diminutive flame-red and pristine-white Nipper that I was not permitted to leave the works without two remarkable demonstrations of its abilities. Firstly, works manager Martin Tips taxied around the small area between hangars with a degree of ground manœuvrability that would out-turn a jeep, and on a mere flutter of revs. Clearly those propeller tests have taught them something in thrust and, even more obviously, the elementary disc brakes coupled with steerable nose gear and 11in independent rear-leg travel offer a roadworthiness rarely associated with aircraft.

Next came a flying demonstration by Bernard Neefs, Avions Fairey's chief test pilot, who managed to insert a few minutes of ultra-light between Hunter 6 and F-84F checks. The put-put of a Volkswagen is a fine sound and in smooth passes, with moderate turns (Belgian C.A.B. men were also watching) the Nipper cavorted delightfully. No pump-handling fugoids on the fast level runs, no wing-waggling on the steep approach as is so evident in contemporary French designs similarly blessed with generous dihedral, and a glued-to-the-deck landing run were most impressive features of M. Neefs' demonstration. Full rudder yaw could apparently be held in a climb, with little aileron to counter the turn, and ground-speed could be built up well beyond the normal 38 m.p.h. for a zoom take-off to present a plan view to onlookers. Neefs is a six-footer and fully occupies the depth of the Goodyear Racer style cockpit. All-up weight was in the region of 600 lb giving about 7½ lb/sq ft wing loading and a cruising speed of 75-80 m.p.h.

Maurice Tips asked my opinion of their Nipper, and as technical manager of the company he was naturally interested in the only design angle which invites criticism. Unfortunately it also coincides with his surname—if it were not for those chopped-off wingtips, the Nipper could lose its utilitarian air. The rectangular box spar which flattens off the NACA 23 series airfoil would be less obvious, the curvaceous fuselage would be better matched and, in spite of what the tunnel men tell us, a rounded glass-fibre capping for all surfaces inspires confidence in tip flow.

But this is minor criticism of what amounts to a design in which so many clever ideas have been incorporated, from the use of twisted copper tube to replace cable splicing to the avoidance of rib taping by directly glueing fabric to the ¼in-wide rib booms, and the neat downward-vision elbow panels for the pilot in each wing-root. With its low c.g., short nose, low aspect-ratio and shoulder wing, the Nipper is a model in more than one sense and will, we hope, achieve the commercial success it deserves.



The second Tipsy Nipper features an enclosed cockpit

The U.S. Industry's Year

GEN. ORVAL R. COOK'S ANNUAL REPORT

AT each year's end the president of the Aircraft Industries Association —America's equivalent of our S.B.A.C.—issues a review of the industry's experiences during the preceding twelve months. Below is reproduced the major portion of this "year-end statement" by Gen. Orval R. Cook, U.S.A.F. (Retd)

THE year 1958 began in an atmosphere of national concern over Russia's manifestations of scientific and technological progress, coupled with a reduced defence industrial capacity due to reduced Government expenditures during 1957. In order to cut defence spending many contracts had been cancelled, programmes had been stretched out, progress payments cut, and employment reduced.

Employment in the aircraft industry continued to decrease for the first five months of 1958, but has increased slightly since then. The national debt ceiling was raised, and during 1958 the economic limitations were somewhat lessened. This was reflected in an increase of more than 50 per cent in the orders placed for aircraft and missiles during the first nine months of 1958, compared to the first nine months of 1957. However, expenditures for the same periods show only a slight gain. The industry still is faced with expenditure limitations which limit, and will continue to limit, the scope of the programmes.

Demands for the aircraft industry to increase its own financial and business risks continue. The Defense Department policy of reducing progress payments to contractors for work accomplished, and requiring much larger investment by the companies in their cost-plus-fixed-fee business, was continued.

Yet, in the face of these various limitations, the aircraft and missile industry during 1958 delivered hardware that placed *four* satellites in orbit, and both intermediate-range and intercontinental ballistic missiles were tested and put into limited production. To meet these changing times, the aircraft companies have made some rather radical changes in their organizations. Companies long known only as airframe manufacturers have, in a brief time, become leaders in propulsion, in guidance, and atomic-energy applications. Virtually every company in our industry is active in one part or another of the guided-missile programme, holding about 80 per cent of the prime contracts for the major missile components—propulsion, guidance, structure, warhead.

Achievements. The United States aircraft industry, during 1958, moved the nation's industry into the jet age with delivery of turbine-powered airliners to both domestic and international carriers. Man's dream of space travel also moved into sharper focus with roll-out, late in the year, of an experimental rocket airplane designed to accelerate to speeds in excess of 3,600 m.p.h. in 90 secs. The fantastic pace for the industry, set by military air requirements, was highlighted in contract awards by the United States Air Force for a trisonic bomber to fly at speeds in excess of 2,000 m.p.h., at an altitude above 70,000ft.

More than 40 missile projects, ranging from small air-to-air missiles to huge intercontinental ballistic missiles, had been announced by the military services by year-end 1958. The nation's aircraft industry plays a major rôle in all of these, with responsibilities in the manufacturing fields of the airframe, the propulsion or the guidance system.

The missile projects, by operational category, include: surface-to-surface, 20; surface-to-underwater, 3; air-to-air, 6; surface-to-air, 9; air-to-surface, 6; diversionary, 2. In addition, there were about 20 test vehicles, drones, targets and surveillance vehicles.

Turbine-powered transports, being manufactured by five different companies, moved either into operational status or very close to it. About ten other new aircraft models went into production during the year.

An Air Force production fighter captured both world speed and altitude records, travelling at 1,404.09 m.p.h., and climbing to an altitude of 91,243ft. A U.S. jet tanker transport chalked up a number of records, including a new non-stop distance record of 10,229.3 miles without refuelling. Smaller craft set official endurance and non-stop records.

Missile firings continued during the year, with one large intercontinental ballistic missile being fired over 6,300 miles. Lunar probes were successfully launched by both Air Force and Army. Although the probes failed to attain the velocity needed to reach the Moon, both ventures were rewarding because of the knowledge gained.

Sales and Production. Sales of the aircraft and missile industry for 1958 are estimated at $11.8 billion,* approximately the same as in 1957.

Despite the high sales, production of military aircraft declined from an estimated 5,500 units in 1957 to about 4,000 in 1958. However, rising expenditures for missiles and space vehicles partially offset this marked decline. Expenditures for the procurement and production of missiles have risen about 60 per cent from fiscal year 1957 to the estimate for fiscal year 1959.

Commercial sales declined for the first three quarters of 1958 as piston-powered airliners were phased out of production. However, the first of the turbine-powered airline transports were delivered and commercial sales were estimated to increase in the fourth quarter. Commercial aircraft, engines, propellers and parts sales are estimated at about $1.5 billion in 1958, compared to $1.6 billion in 1957.

Total commercial aircraft production, including helicopters, for 1958 is estimated at 6,780 units, slightly higher than the 1957 output of 6,745 units. The value of the 1958 civil aircraft production is estimated to have been about the same as in 1957. About 225 transports were delivered in 1958, compared to 322 units in 1957. More than 50 of these were turbine-powered transports. At the end of October, U.S. manufacturers had orders for more than 600 turbine transports, valued at about $3 billion.

Utility-aircraft production was higher in 1958 than in 1957. About 6,300 utility airplanes were delivered in 1958, compared to 6,118 in 1957. The value of these shipments was approximately the same as in 1957—about $100 million.

Sales and Earnings. Sales of the twelve major airframe manufacturers, paralleling those of industry as a whole, were about $7.0 billion, compared to $6.9 billion in 1957. Earnings, however, continued to decrease. The average net profit, as a percentage of sales of the twelve companies, has decreased steadily since 1954—from 3.7 per cent, to 2.4 per cent in 1957. Earnings of the twelve companies were $105.8 million for the first nine months of 1958, compared to $120.1 million for the same period last year. The ratio of earnings to sales for the first three quarters of 1958 was approximately 2 per cent, compared to 2.4 per cent for the similar 1957 period, and the annual ratio of earnings to sales will not improve over the nine months' ratio. The decrease in profit of the aircraft companies, although sales have increased, is due to many factors, principally contract cancellations and stretch-outs, reduced progress payments, economic limitations, and proportionately more research and development contracts than production contracts.

Backlog. The backlog of the aircraft companies is steadily declining. It has declined $1.4 billion since the first of the year. As of September 30, 1958, aircraft companies had orders on their books for $13.1 billion, compared to $14.5 billion on December 31, 1957. The backlog has declined more than $5 billion since September 30, 1956.

Reduction in military aircraft backlog accounts for about a billion of the 1958 decrease, and approximately $4 billion of the $5 billion decrease during the last two years.

While it is not possible to calculate the exact increase in the missile backlog, it appears that it does not equal the reduction in the aircraft backlog.

The commerical backlog has remained fairly constant for the past year as deliveries of the turbine-powered airline transports started late in the year, and the backlog of piston-powered transports had dropped substantially.

Employment. First reversal after 13 consecutive months of declining employment in the aircraft and parts industry occurred in June 1958, when employment increased by 8,400 workers over the previous month. June employment was 751,200 compared with 742,800 in May—the lowest point in employment since 1955. By May 1958, employment had declined 149,200 workers—a drop of 17 per cent from the peak post-war employment of April 1957.

Employment at the end of September 1958 was 760,900 and is expected to remain at about this level into the first months of 1959.

Although the work force of the aircraft industry has decreased, the trend has been toward more highly-skilled personnel, which is reflected in their earnings.

Costs. The aircraft industry is fighting a battle on two fronts. As the industry fights the technological battle in development of powerful new weapons systems, it simultaneously fights to reduce development and production costs.

Average hourly wages of aircraft industry employees are also a major factor and they continued to increase during 1958, climbing from a 1957 annual average of $2.36, to $2.55 in September 1958. Corresponding average weekly wages have increased from the 1957 annual average of $96.76, to $103.79 in September 1958—an increase of more than 7 per cent.

**The American billion is 1,000 million.—Ed.*

FAUVETTE

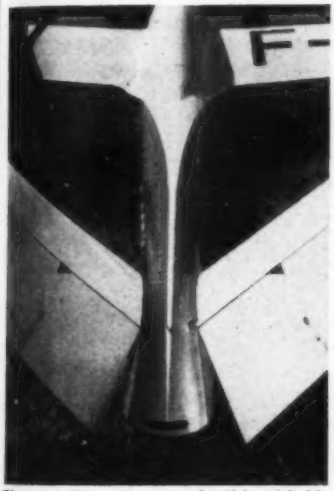
IMPRESSIONS OF THE BREGUET 905

By Tony Goodhart

ONE of the very few really new designs at the World Gliding Championships at Leszno last year was the Fauvette built by Avions Louis Bréguet and flown into ninth place in the standard class by the French pilot Labar. It immediately attracted notice, not only by its bright red-and-white colour scheme, but because it was apparently so small and neat. When one saw it wheeled out with one man at the wingtip and another with the tail casually over his shoulder, one had an instinctive feeling that here was the sailplane for the private owner.

There were admittedly faults, such as a distinctly non-laminar top wing surface, a rather flimsy rear lifting handhold and an awkward-looking set of empennage control connections—all, I understand, to be remedied in production models. It must be remembered that the Fauvette at Leszno was the first prototype and that the whole aircraft was designed and produced in under six months.

The Bréguet maintenance team had brought with them a demonstration kit of the parts for a second 905 and these showed some of the clever construction methods which have led to a finished product with a reported gliding angle of 1 in 32, for an empty weight of a little over 300 lb. Loaded weight of the 905 is 510 lb.



The vee-tail permits a novel tail hand-hold to be incorporated

Since the championships I have had the opportunity to visit the Bréguet glider factory at Aire-sur-Adour, where I was very kindly shown the complete method of construction. The main "trick" has been to use a very light, though strong, sandwich for the wing in front of the spar, for the fuselage behind the wing and for the fixed tail surfaces. This sandwich is composed of 0.6 mm ply with an 8 mm jam of Klegecel, an expanded plastic.

The Klegecel is preformed under heat and the whole sandwich, complete with glue, is fitted into a mould and enclosed in a plastic bag, which is then evacuated by a pump so that near-atmospheric pressure is applied through the plastic bag, which has been carefully smoothed while the air was sucked out. The bag is kept evacuated for 48 hr so that the cold-setting glue may set thoroughly and also that any prospective bubbles may be sucked out.

The result, for example for the wing in front of the spar, is a near-perfect one-piece shape of considerable strength and remarkable lightness—no ribs to cause distortion or add weight, so that each *complete* wing weighs a mere 75 lb. Compare that with some other wings!

The fuselage consists of three main parts: steel-tube centre and forward sections, and a rear sandwich cone (no bulkheads) of quite absurd lightness. As is pointed out in the Bréguet brochure the aircraft is designed so that each major part is separate and can be replaced as such.

The vee tail looks somewhat delicate but is, in fact, extremely sturdy. As mentioned before, the system of controls for the rudder-vators seems a bit awkward but nevertheless it appears to work entirely satisfactorily. It is not possible, however, to apply full rudder and pull the stick hard back at the same time—but then who ever wants to?

The cockpit is comfortable, and there is plenty of room even for the over-six-footer. Visibility is excellent in all directions, and one can even see the tailfins.

In the air—I had the good fortune to be invited to fly the Fauvette at La Ferté Alais—one has an immediate impression of being on top of the world, engendered by the excellent visibility and the feeling that the aircraft will do exactly what is asked of it. The controls are crisp and the rate of roll is good, though this is to be improved to make it more compatible with the rudder action, which is ample.

The prototype Fauvette, designed and built in six months

A feature which had not occurred to me beforehand was that rudder movement with the butterfly tail produces a rolling moment as well as a yawing moment. Gentle turns can thus be made with rudder only, with practically no noticeable sideslip.

Circling in thermals seemed very pleasant, the aircraft having just the right amount of lateral stability to stay put in the turn. The straight stall was straightforward and a stall off a turn dropped a wing, but not at all violently.

Fore-and-aft stability seemed adequate but not excessive; the prototype had no trim-tab but one is to be fitted in production models. The divebrakes appeared to be thoroughly efficient (though a terminal-velocity dive was not attempted) and permitted a really steep approach.

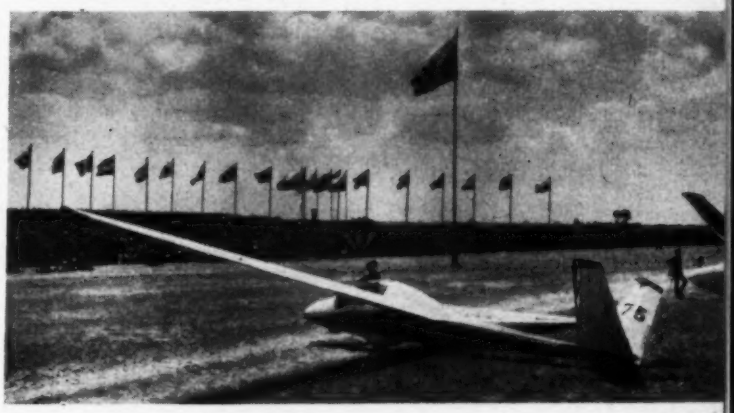
The Fauvette is altogether a delightful aircraft to fly and also to handle on the ground. The Bréguet company and their talented glider designer, Monsieur Cayla, certainly deserve congratulations.

There is one fly in the ointment, however, which unfortunately cannot be overlooked, and that is the price. The company's excellent brochure says: "Our target . . . has been to put on the market a performance sailplane priced low enough to be bought by anybody." Although, as far as I know, no firm price has yet been quoted, the figure being bandied around is in my opinion too high when one remembers that sailplanes of comparable performance can be bought much more cheaply in other countries. Admittedly the price is way below that for the high-performance and excellent Bréguet 901; but the 905 has been built specifically as "anybody's" performance sailplane.

If I may make so bold as to criticize, I believe that the fault lies to some extent with the French governmental inspection authorities, who demand an unduly meticulous standard of perfection in the finish of every little wooden part, whether stressed or not. Since man-hours constitute the major part of any cost these days, it does seem that certain savings could be made without any loss of strength or safety. With all respect to the Bréguet company, too, I suspect that their sailplanes (not unnaturally, in their eyes) are just as much Bréguet aircraft as any others and so must be expected to bear their full share of overhead costs.

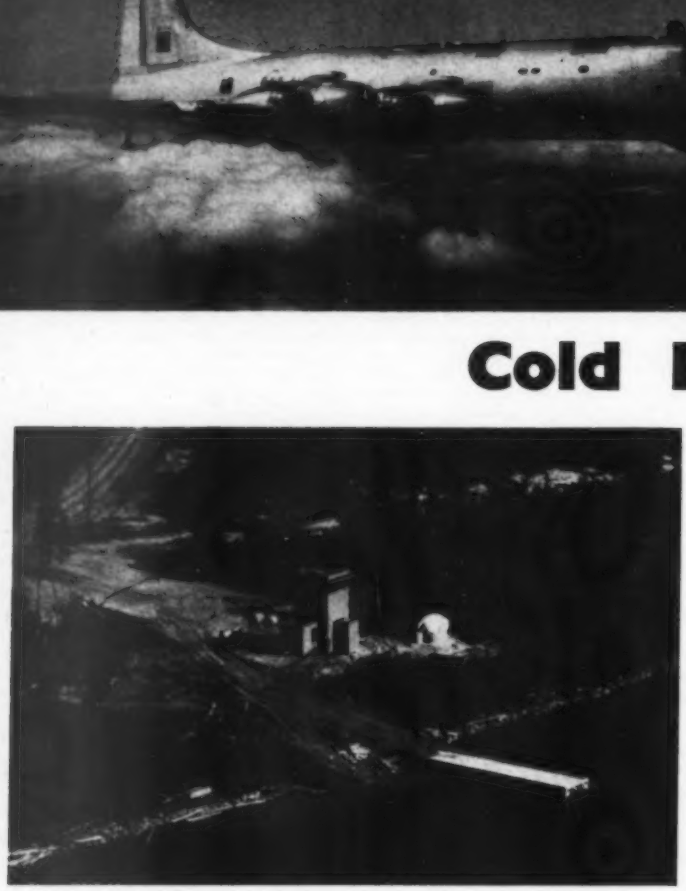
Bréguet 905 Fauvette: Span, 49.2ft; wing area, 121 sq ft; aspect ratio, 20:1; wing taper ratio, 3:1; length, 19.7ft; loaded weight, 510 lb.

The new machine achieved ninth place in the standard class of last year's World Gliding Championships at Leszno, Poland

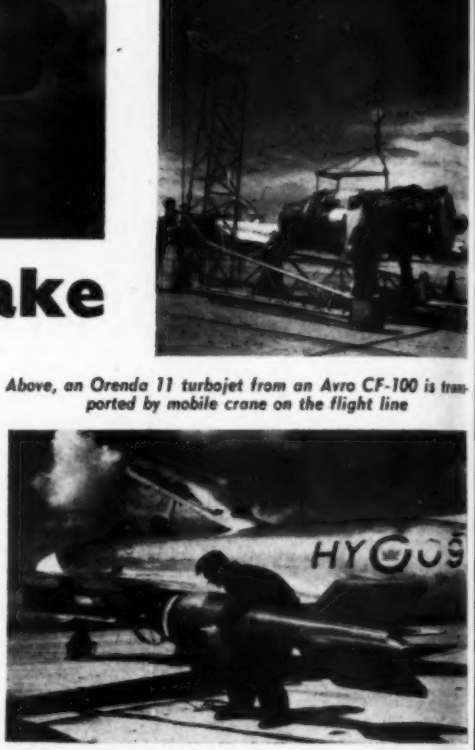


Left, a Canadair CL-28 Argus of the C.E.P.E. Aircraft Armament Evaluation Detachment at Cold Lake. Specially mounted cameras for stores-dropping trajectory studies are visible

Cold Lake



Above, an Orenda 11 turbojet from an Avro CF-100 is transported by mobile crane on the flight line



Left, one of the cine-theodolite stations fringing the Primrose Lake evaluation range. Above, a Radop target being fitted to a T-33 of the Weapons Practice Unit

ADVANCED FLYING TRAINING AND WEAPONS EVALUATION BY THE R.C.A.F. IN ALBERTA

A.A.E.D. hangar scene at Cold Lake includes CF-100, Sabre, T-33, Mitchell and Argus

DOUBTS concerning the future of the Avro Arrow production programme have brought uncertainty to many industry and Service units in Canada. Nowhere in the R.C.A.F. will a change in Arrow policy have a greater effect than at Cold Lake, Alberta, the headquarters of a sophisticated evaluation system tailored to the Arrow and which (as described in *Flight* of August 22 last year) was well on the way to incorporating the best air-to-air missile test range in North America.

Some of the current activities at R.C.A.F. Station Cold Lake are illustrated on this page. They include those of the Aircraft Armament Evaluation Detachment of the Central Experimental and Proving Establishment; the Weapons Practice Unit which gives refresher rocket-firing practice for operational CF-100 squadron personnel; and No. 3 Operational Training Unit, which brings CF-100 crews up to operational standard. Rocket-firing practice is carried out in a 4,000 sq mile weapons area, included in which is the fully instrumented evaluation range at Primrose Lake.

Straight and Level

BE prepared for a walk-out by Plummet Air Lines from the forthcoming meeting of the I.A.T.A. Hemlines Conference. The previous meeting, it may be recalled, ended in a deadlock. No agreement could be reached on the reported B.E.A. proposal for a skirt-differential of 2½in between air girls with fat legs and air girls with slim ones.

The more gallant airlines regarded this (to quote Plummet) as "unfair and improper discrimination which will threaten the whole structure of international air girl skirt agreements, not to mention the public interest."

If no agreement is reached at the next meeting it will be up to the Government to decide hemline levels. It may or may not be significant that an M.T.C.A. delegation has reportedly already left for Montreal to attend an emergency session of I.C.A.O., the International Civil Aviation Organization.

● Go it, Lady Douglas. One of my reporters spoke to her last week about B.E.A.'s low hemlines. "I had no idea, when I casually mentioned them to Sholto," she said, "that it would lead to all this fuss!"

From left to right: Miss Ann Hale, Lufthansa; Miss Lydia Jarvenets, B.E.A.; Miss Paula Klein, Sabena

Never mind, my dear lady. Two other things you might mention to him, as they vitally affect the future of Britain as an air-trading nation, are the frumpish thickness of some of his air girls' high heels, and those school-marmy feather devices in their hats.

Passing thought: Eagle Airways (Bermuda) air girls are exempt from the controversy—they wear shorts. I am not so sure about Wien Alaska Airlines—their girls wear trousers and snow-boots.

● It was quite a variegated week for air news. My team of reporters has been filing stories not only on hemlines, but on our solar system's new man-made planet, the happy ending to the *Small World* balloon epic, and on the de-fuzing (by F/L. J. W. Waters, R.A.F., and a German colleague) of an unexploded British bomb revealed when the Sorpe Reservoir in North Rhine Westphalia was drained. I doff my hat to all concerned, and to the Air Ministry spokesman who told me:—

"The bomb was dropped shortly before 10.00 hr on the morning of October 15, 1944, by a Lancaster Mk 1 of No. 9 Squadron R.A.F. Bomber Command based at Bardney, Lincs. The raid was by a large formation of Lancasters escorted by Mustangs, and was led by W/C. J. M. Bazin, D.F.C., of Newcastle."

All right, all right! I only asked.

● As for the Sun's new satellite, I cannot help wondering who on Earth now owns it. My expert adviser on space technology and law, Sir Justin Galaxy, said to me last week with cosmic humility: "I don't know."

I imagine the matter will not go before the courts until, in 300 years' time, the Society of Space Antiquarians charters a Scruggs S.A.423 Spacematic for a weekend space-archæology outing to locate it. With a good driver, Interstella Decca Mk 10, plenty of knitting patterns for the old ladies, and a bit of luck, they could draw up alongside the thing, chuck out a tow-rope and bring it back for M.o.S. experts to examine. Then, armed with its secrets, Britain could Catch Up In The Space Race.

● "The Astronomer Royal, Dr. Richard Woolley, returned to London by air today from South Africa.

"Dr. Woolley was asked at London Airport about a statement attributed to Prof. Anatoli Blagonravov, head of the Soviet Academy of Sciences, that Russia may try to land a manned rocket on Mars or Venus in the autumn.

"He said: 'If they get to Venus they will find it is boiling hot. If they get to Mars they will find it freezing cold. On neither planet will they be able to breathe. The best of luck to them.'"—*Reuter, January 8.*

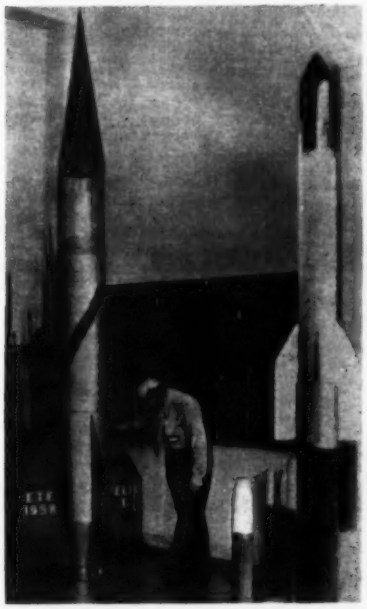
● "Real hairy griff, straight from the equine intake" is how *The Architect's Journal* describes *Flight*'s special missiles number of December 5, 1958.

Under the heading Not Quite Architecture, Mr. Reyner Banham quotes large chunks of our "hairy griff," and observes: "You will be humiliatingly aware that it is . . . a technology several technologies in advance of the sort of technology that building business thinks of as advanced . . . For all that dough you could have vaporized practically every outstanding problem in building and town-planning . . ."

Other specialist journals might have said the same about the still unsolved problems of *their* professions. As I've remarked before, man could build a paradise on earth with the brains and money he has spent on missiles. I made a quick check from our special number of how much America has so far spent on missiles. It tots up to a cool £6,000,000,000—and it is probably in fact much, much more.

But so long as the hairy missile boys wish the money could be better spent—which I believe all of them do, no less than the *Architect's Journal*—then there's honour in the arsenals of the West. Already there are signs that space-exploration will soon be more important than making weapons.

● Recently I commented on the fact that some aircraft never seem to be on the ground, while others always are. Helicopters are particularly prone to low utilization. But a recent intensive-flying programme by the U.S. Army has shown that a well-developed helicopter can log time as rapidly as can a fixed-winger. Two Sikorsky H-34 Choctaws (S-58s) and two Vertol H-21 Shawnees were involved. During a period of 82 days these machines flew 4,000 hr. Mean utilization: 12 hr 11 min daily per helicopter for nearly three months.



Col. Manuel dos Santos Lage, head of Brazil's Felix I rocket project, checks Felix in the Brazilian Army technical school laboratories near Rio de Janeiro. The 875 lb rocket is to be fired with a cat on board. Col. Lage hopes that the cat, Flamengo, will return to earth safely, as it is the pet of his two children

● From the Admiralty I learn that the aircraft carrier H.M.S. *Warrior*, now recommissioned as the Argentine Navy's A.R.A. *Independencia*, has arrived at Buenos Aires.

The task of recommissioning her must have been quite exerting for the Argentine sailors. It was, says the Admiralty, "a task performed by a steaming crew of 300 men . . ."

ROGER BACON

No. 112 (FIGHTER) SQ

How a Distinguished Royal Air Force Unit Got Its

One of the Sopwith Camels with which No. 112 Sqn. was equipped in 1917-18 when it was based at Throwley, between Charing and Faversham in Kent, as a Home Defence squadron. Standing by the aircraft is Capt. Baker, O.C. "B" Flt., and refuelling it is A/c. Tucker

MOST R.A.F. squadrons have records from which their history can be compiled, though not all are lucky enough to find a conscientious biographer. No. 112 Sqn., which gained a distinctive reputation in the Desert Air Force because of its "sharks' teeth" insignia and its famous pilots (such as "Billy" Drake and Neville Duke), has been fortunate in both respects. From information he has assembled, F/L. Robin A. Brown, who was a member of the squadron when it was disbanded in 2nd T.A.F. in May 1957, has written an excellent 173-page history in typescript with eleven appendices. With his permission, we reproduce here some extracts, giving a chronological glimpse of the squadron's activities during two World Wars.

During the first, No. 112 was based at Throwley, near Faversham in Kent, as a night-fighter squadron and on occasion was exceptionally busy:—

It is not known how many times the squadron was ordered into the air to intercept enemy aircraft, but they had no success until the night of 19th/20th May, 1918, when the Germans raided England for the last time, and with the greatest number of aircraft. On this occasion forty-three enemy aircraft, of which thirty-eight were Gothas, two were reconnaissance and three were Giants, crossed the coast and made for London. This number of raiders was well over twice the number that had ever previously been sent. Thirteen enemy aircraft reached London and seven were brought down, three by A.A. fire, three by night fighters and one which force-landed.

Of the three enemy aircraft destroyed by the night fighters, one was brought down by Major Brand flying a Camel fitted with twin-Vickers, and a Lewis gun mounted above the upper wing. He had taken off, with two other pilots in complete darkness, without the aid of flares, climbing to meet the incoming stream of bombers. One Gotha, which had crossed the Kentish coast at Broad Salts, south of Margate, flew westwards across Canterbury and then turned north near Throwley at 2316 hours. At about 2323 hours Major Brand met this aircraft at 8,700ft over Faversham, and with his first burst set one of the engines of the bomber on fire. The Gotha turned sharply and began to descend. Major Brand followed it down and kept up his attacks until the whole aircraft was on fire. The Camel was so close that the leading edges of the wings were scorched, the underside of the fuselage was ripped open and the pilot's face was burned. The Gotha crashed near the sea wall by Leysdown on the Isle of Sheppey at 2329 hours where it was destroyed in the shallow water with its crew.

Having been disbanded in 1919, the squadron was re-formed in 1939 with Gloster Gladiators and based at R.A.F. Helwan for the defence of Cairo and the Nile Delta. The following passage describes a combat with the Italians in October 1940:—

There was a fine fight to finish off the month. The Regia Aeronautica, attempting to retaliate against the bombing attacks against his Libyan communications and ports sent fifteen S.M.79s and eighteen CR.42s to try to bomb our forward ground positions. Flt.Lt. Abrahams, Fg.Off. Fraser, Fg.Off. Clarke, Plt.Off. Duff, 2/Lieut. Smith took off on patrol of the Mersa Matruh area at 1300 hours. Plt.Off Duff sighted ten of the S.M.79s and gave chase, but did not see the escorting CR.42s. Six dived on him and shot him down, he escaped by parachute suffering from slight burns. The CR.42s were then engaged by Flt.Lt. Schwab, Plt.Off. Acworth (who had joined the patrol) and 2/Lieut. Smith. Flt.Lt. Schwab shot down two confirmed, but had to force land due to engine failure. Plt.Off. Acworth shot one down and then collided with 2/Lieut. Smith. Both pilots escaped by parachute, but the latter dislocated his collar bone. Fg.Off. Fraser and Fg.Off. Clarke who were also ordered off from Readiness engaged the bombers and Fg.Off. Fraser put one engine of an S.M.79 out of action. Fg.Off. Clarke was posted missing after this engagement, in which the enemy lost at least eight aircraft.

In January 1941 the squadron went to Greece, where its Gladiators proved more than a match for the Italians:—

28th February, 1941, was a record day in the squadron's history. Eleven pilots joined in a general offensive over Sarande - Argyrokastron - Valona - Topelene with the result that five G.50s and five CR.42s were shot down and two CR.42s and one BR.20 damaged. The formation, which consisted of nineteen Gladiators, echeloned in vics of three, plus ten Hurricanes in vics, flying at 14,000ft saw the enemy aircraft below them. In the resulting fight Flt.Lt. Fraser got two, one CR.42 (the parachute not opening) and one G.50 (which flew into the mountain side), Flt.Lt. Fry two (one CR.42 and one G.50), Sgt.Plt. Donaldson one and a probable (one G.50 which was seen to crash on the edge of the sea and one G.50), Sqn.Ldr. Brown one G.50, on which he made an unobserved stern attack.

It was when No. 112 Sqn. was back in the Western Desert, operating Curtiss Tomahawks, that the idea of the "sharks' teeth" insignia originated:—

About this time, September 1941, the "shark's teeth" first appeared on the squadron aircraft. As a design, there was nothing original about it, but it was probably 112 Squadron that was the most famous bearer of it. . . . The Tomahawk lends itself to a design of this sort, with the large gaping intake beneath the propeller boss, and it doesn't seem to have been long before someone on the squadron thought of the idea. . . . Either some anonymous fitter, or, as one authority states, Plt.Off. Westenra, decided that what the radiator needed was a mouth, and so to distinguish his own aircraft from a distance he painted on the first

Above, a group of the squadron pilots with one of its Tomahawks at Fort Maddelena in November, 1941. Second from the left (standing) is Neville Duke, who was then a pilot officer

Right, wingtip guidance is given by an airman of No. 112 as a squadron pilot taxies his Kittyhawk in during a sandstorm

ER SQUADRON

...ce U... ...ot Its Teeth into the War

A Sabre F.4 and Hunter F.4 of No. 112 Sqn., bearing the sharks' teeth markings, in formation during the summer of 1956

sharks' teeth. Unfortunately for him everyone liked the idea, and soon every aircraft carried the design. No other squadron used the idea and it was not long before 112 became well known because of it—it caught the popular imagination and still today, people who would never recollect the number 112 remember the sharks' teeth markings. The squadron went by a variety of names as a result—"The Killer Sharks," "The Tiger Sharks" or "The Shark Squadron." The colouring of the teeth and eyes was as follows—lips black, teeth white, interior of mouth bottom-half red, top-half aircraft background colour, usually desert brown. The eyes were also black, white and red.

That the squadron's Tomahawks managed to hold their own against the Me 109s is proved by the following combat report from December 1941, just before it re-equipped with Kittyhawks:—

The following day saw the squadron achieve as great a victory as the ones in Greece. At the end of the fight ten enemy aircraft had been destroyed by 112 Squadron and twelve by 250 Squadron. 250 Squadron was led by Sqn.Ldr. "Killer" Caldwell, and the pilots of 112 Squadron's formation that day were Flt.Lt. Ambrose (AK-475), Fg.Off. Soden (AK-377), Plt.Off. Duke (AN-337), Sgt.Plt. Leu (AK-354), Plt.Off. Bartle (AN-372), Plt.Off. Bowker (AK-509) and Plt.Off. Sabourin (AK-457). This formation, which was led by Flt.Lt. Ambrose, took off at 1120 hours and sighted an enemy formation of thirty to forty Ju 87s in vics of three supported by twenty to twenty-five G.50s and M.200s as close escort. . . . The final score was as follows: Plt.Off. Bowker destroyed three Ju 87s and damaged a G.50. Two of these Ju 87s blew up in the air, but where a formation lost an aircraft the remaining Stukas closed the gap and continued solidly towards their objective. Flt.Lt. Ambrose thought that he probably destroyed an M.200 and a G.50. Fg.Off. Soden attacked a Ju 87 and shot off its tail, which fell off by degrees in the aircraft's dive. An Me 109F that he shot at lost its engine cowling and hood but it was not seen to crash. Sgt.Plt. Leu attacked an M.200 from out of the sun—it did not see him coming and spun in. He also attacked an Me 109F, which "seemed to falter in the air" and then dive, but he did not see the result. Plt.Off. Sabourin shot down one Me 109E which fell in an uncontrolled spin with smoke coming from it, and also a G.50 which fell burning. He destroyed a Ju 87, which crashed near El Adem, and in addition he damaged a G.50, an Me 109E and an Me 109F. Plt.Off. Bartle shot down one Ju 87 and chased a G.50 over El Adem, so that it was shot down by its own flak.

That warfare in the desert had its difficulties, as well as its occasional compensations, is shown by the following extracts:—

1078498 L.A.C. Tingle, an armament mechanic, writing after the war (1957) had this to say about dust storms. ". . . 112 Squadron were always up with the Army, and therefore our living conditions were what we made them—a dugout in the sand with a bivouac over the top. For a bed, a piece of sacking nailed over two lumps of wood, with two end pieces to keep it tight. Of course everyone did not have it so comfy, for some it was just their two blankets and head down in the sand. . . . Then there were the sand storms. One could see them coming, a large brown cloud far off in the distance. That was the time to get out a ball of string, tie one end to a stick in your dug-out and take the other end to the cookhouse. The reason for this was that sometimes these storms lasted three or four days and to be lost in a sand storm—only those who have been lost in one know what it is like."

On 14th April there was an A.O.C.'s parade, taken by A.V-M. Coningham, who presented the squadron with its official badge signed by H.M. the King. In his address the Air Vice-Marshal complimented the squadron on its fine record, mentioning particularly the unfailing loyalty of the ground crews.

When victory had been achieved in Africa the squadron moved north with the rest of the Desert Air Force and when in Italy celebrated (on May 17, 1944) the fifth anniversary of its arrival overseas. Then six weeks later came another milestone, equipment with North American Mustangs:—

On 5th July the squadron operated for the first time with the Mustangs. Four operations were flown, the first being an armed recce of six aircraft led by the C.O. . . . On the 6th the last of the Kittyhawks were flown away, the squadron having had them since January 1942. The squadron had got through 408 Kittyhawk aircraft, of all Marks, of which five aircraft returned twice to the squadron after being withdrawn, and one aircraft returned three times; 112 Kittyhawks were lost through enemy action.

With the end of the war in Europe came the end of active operations for No. 112 Sqn.: —

On 8th May (VE-Day) the squadron was also stood down. They all listened to Churchill's speech at 1500 hours and the evening dissolved into celebration. . . . Thus for 112 Squadron the war ended. It had destroyed, by official reckoning, 164 confirmed, 48 probably destroyed and 81 enemy aircraft damaged. It had lost, by a strange coincidence, 163 aircraft destroyed or badly damaged; 106 of the squadron's pilots had been killed or taken prisoner, or been killed in flying accidents since the beginning of hostilities.

At the end of the war the squadron was disbanded, then reformed in May 1951 with D.H. Vampires, at first without sharks' teeth markings but later acquiring the traditional insignia:—

As early as November the squadron were considering carrying the famous "sharks' teeth" markings again, and a letter from the C.O. to the ex-M.O. of the squadron, Wg.Cdr. Camm, mentions that they were already experimenting with various positions, and shapes for the teeth. . . . The main departure from tradition when the painting was finished was in the colouring. . . .

Then when North American Sabres replaced the Vampires (in January 1954) the new aircraft were similarly "branded":—

The Sabres were now being painted with the sharks' teeth markings in preparation for the visit of H.R.H. Princess Margaret, which took place on the 15th. The Sabres were perhaps the most disappointing aircraft when painted with the sharks' teeth, the mouth looking rather incongruous with the gaping intake as well.

During 1956 came a further (and, as it proved, final) change of equipment, to Hawker Hunter F.4s:—

May began with everyone eager to get cracking on the Hunters. . . . Some of the pilots began ferrying Sabres back to the U.K. and Fg.Off. Frame was converted on to Hunters. On 10th the pilots started marking the new aircraft with sharks' teeth.

But at the end of May 1957, No. 112 Sqn. was officially disbanded:—

The 16th May being the anniversary of the squadron re-forming in 1939 was also the final day on which the squadron was operational in 1957; 112 took part in an exercise that day which started at 0600 hours. . . . At 1600 the exercise finished and at 1645 all available aircraft—eight of them—took off for a final fly-past.

By 31st May, 1957, the date on which the squadron officially ceased to exist, only three pilots were employed on the station, the C.O., Flt.Lt. Brown and Plt.Off. Lamb. . . . At 2359 hours on the 31st, with no further celebration or fuss, No. 112 (Shark) Squadron, Royal Air Force, was disbanded.

A squadron group taken in August 1956. Standing (left to right) are F/O.s B. Baker and E. Roberts, F/O. J. Edwards, F/O.s R. Mansfield and H. David and F/L. Paddy Glover. Seated (l. to r.) are F/O.s "Taffy" Heath, R. Davey and R. Crumpton; S/L. F. M. Hegarty, A.F.C.; F/L. R. A. Brown (the squadron historian) and F/Os. P. Frome and R. Brown

THE RECORD-BREAKING ROTODYN

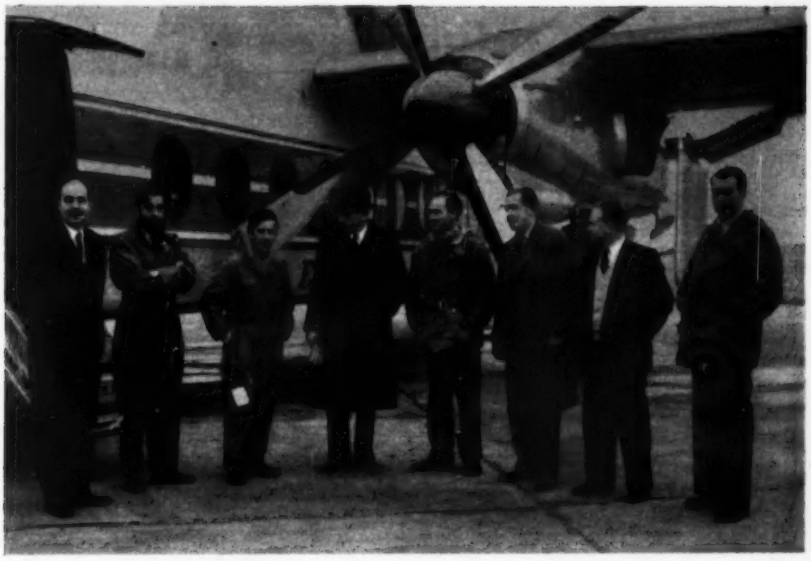
THE new 100 km rotary-wing closed-circuit record of 190.9 m.p.h. by the Fairey Rotodyne, reported in *Flight* last week, was a fine achievement and provides confirmation of the makers' claims for this remarkable aircraft. The record speed (which remains subject to F.A.I. confirmation) actually represents the true cruising performance, since the 2,800 s.h.p. at present available from each Napier Eland was not used, the engines being held throughout to the one-hour j.p.t. and torque settings. Gross weight was a little below the 33,500 lb at which most flights have been made. The course was 100.68 km long, with long out and return legs connected by a two-mile radius (Rate ½ to ¾) turn at the outer end and a tight completing turn over White Waltham airfield. A light wind of about 12 kt was blowing from the north-west. In addition to Ron Gellatly and John Morton, the crew included Dr. D. B. Leason, Fairey powerplant observer, and Mr. E. J. Blackburn, strain-gauge operator. Mean height was about 1,000ft.

A speed of 200 m.p.h. has already been exceeded in the autogyro condition and 160 m.p.h. as a helicopter. Best transition speed has been settled between 90 and 140 m.p.h. and autorotation has been maintained down to 80 m.p.h., at which speed the wing is providing about 15 per cent of the lift. At high speeds the wing contributes some 55 per cent of the lift. It is calculated that, following an airframe-modification, speeds will reach 280 m.p.h.

Recent flights, and the record too, were made without the noise suppressors, which had been removed as part of the test p gramme. New silencing nozzles, which promise a remark 12 db reduction in noise, are being prepared and will shortl tested. Though these may well provide an effective palliativ the present noise during the helicopter stages of take-off and l ing, Fairey are confident that entirely new approaches will re rotor noise to a level where propeller noise will predominate.

The Rotodyne is, of course, intended for airline operations i weathers and at night. Translations have already been mad cloud, and landings completed at night and in 300ft-deep with visibility of 150 yd. An autopilot which could be used c in cruising or hovering flight is also in sight. Single-engi flight has been investigated in level, shallow-climb and hove conditions. Prospects of being able to perform a fully a rotational landing are good, though one engine (and therefore of the tip-drive units) should always remain available. Run landings in autorotation at about 60 kt represent the most diffi case, a problem being maintenance of correct pitch-attitude.

So far some 160 flights have been made, totalling about 60 ho and serviceability has been remarkably good. The interest offic expressed by B.E.A. was reported in *Flight* last week; and re sentatives of New York Airways also recently visited W Waltham to inspect the Rotodyne. Okanagan Helicopters h announced their intention to purchase one Rotodyne.



Many of those responsible for achieving and observing the Rotodyne's 100 km closed-circuit speed record are in the groups above and below. Above, from left to right, are Dr. G. S. Hislop, Fairey's chief engineer (aircraft); John Morton, Rotodyne co-pilot; Ron Gellatly, pilot; G. W. Hall, chairman and managing director; Peter Twiss, chief test pilot; C. H. Chichester Smith, director; F. Parker, engineering manager; and Gordon Slade, superintendent of flying. The cheerful group of Fairey personnel and Royal Aero Club observers, below, includes Hubert Broad, R.Ae.C. (extreme left); Maurice Imray, also R.Ae.C. (second from right); and, in front of him, A. Stepan, head of the Fairey propulsion group. The views of the Rotodyne in flight clearly show the new vertical position of the upper fins. They are hydraulically hinged down during take-off and landing to afford maximum clearance for the rotor

Operational Implications of the Fairey VTO Airliner's Notable Achievement

Club and Gliding News

SECRETARY-GENERAL of the Royal Aero Club for the past 13 years, Col. R. L. Preston is to relinquish this appointment, at his own request, on April 30. His main duties are being taken over by Maurice Imray, aviation secretary, and William Marsden, house secretary. Col. Preston has accepted the appointment of honorary secretary-general as from May 1 whereby, the club state, "his experience and ability will not be lost to the club; when required he will represent the club on international and national committees and attend our various committee meetings."

THE move of flying clubs from Croydon Airport to the official alternative base of Biggin Hill, originally scheduled to be made by the end of 1958, had not taken place as this issue goes to press. The situation remained as briefly reported last week, with the clubs being permitted a total of 20 movements per day from Croydon, and circuits, landings and other training being carried out at Biggin Hill.

In a newsletter circulated last week, Surrey Flying Club listed their reasons for the delay in moving to Biggin. Firstly, they emphasized, the main problem was that of determining which Croydon organizations would be making this move. Morton Air Services and Olley Air Service were going to Gatwick, and other non-club operators and maintenance firms had not yet decided between Gatwick and Biggin.

The second problem listed by the club was that of the cost of operating the airfield (at Biggin): "If Surrey Flying Club and the various smaller clubs and groups were to go, the cost would not be too disastrous as not much is required in the way of special service. However, others wish for additional facilities which would send the costs up astronomically, and they would find it difficult to pay the extra amount involved." Thirdly, the newsletter refers to hangarage: "There are two fine big hangars available at what is to us a very high rent. . . The difficulty here is that the Air Ministry find that they can only let the hangars as a whole, and only the very biggest maintenance firms would be able to take on the commitment. As a by-product of this problem, if all at Croydon decide to go to Biggin Hill there will be insufficient floorspace in the hangars available."

In the account of the club's problems printed in the newsletter, Surrey purposely refrain from inserting comment on the rights or wrongs of the Croydon closure or of the time limit imposed on the clubs. The Minister's December 30 decision, however—that the Croydon clubs should be grounded from January 1 until they were allowed to fly at Biggin, and then should be allowed only 20 Croydon movements per day, and this only until the end of January—does call for comment. This decision, to say the least, was strong evidence for those who claim that Mr. Watkinson has discriminated and is discriminating against the clubs. His action makes an interesting contrast with his words in the House of Commons on November 5, when he asserted: "No one is keener than I to encourage private flying." The accuracy of this claim now seems rather doubtful.

A NEW trophy, to be awarded annually for the most noteworthy performance in aviation by a British woman pilot, has been established to commemorate the work of Jean Bird, who was killed in a flying accident at Manchester in April 1957. Known as the Jean Lennox Bird Trophy, the award—an antique Chinese jade carving—will be administered by the British Women Pilots' Association. The selection of candidates will be made by a special committee comprising Lord Brabazon, Lady du Cros, Maurice Imray (Royal Aero Club), Capt. O. P. Jones (G.A.P.A.N), Miss Alison King (B.W.P.A.), Alan Sproxton (A.B.A.C.) and Philip Wills (B.G.A.). Flying clubs, gliding clubs, other organizations and individuals are invited to propose candidates for the 1958 award: these nominations should go to Miss M. Woodall, 71 Vale Road, Worcester Park, Surrey, by January 31.

Rev. P. O'Kelly dismounts from his home-built Turbulent G-APCM after his first flight in the machine at Newtownards on December 23

PRACTICE formation flying by members of Plymouth Aero Club has begun at Roborough, with the ultimate aim of producing a club display team. Members of the team, who fly Tiger Moths, are Bill Boylett, Peter Lucas, Ted Szparowski, Doug Taylor and Jack Ware, and instruction is given by Mr. Lucas, Dick Gliddon and Philip Cleife. The club's annual dinner dance is on February 13 at the Duke of Cornwall Hotel, Plymouth.

RETROSPECT

From "Flight" of January 16, 1909

Church bans Flight: If General Kovanko, one of the speakers at the annual meeting of the Russian Aero Club, has been correctly reported, it would appear as though the Orthodox Church is opposed to the study of aviation. It seems also, although the secret has been well kept, that Russia has a peasant who can easily beat Wright and Farmas at their own game. He is said to have had the audacity to fly over a church in the aeroplane he has invented, and for this deadly sin he was prosecuted by the priest, condemned to be birched and anathematised by the local diocesan council. We ought to hear more of him—or the reporter.

SOCIAL activities at Lancashire Aero Club, Barton, are on the increase, a resident band for dancing on Saturday nights having quadrupled clubhouse attendances recently. Elected at last month's committee meeting were the following sub-committee members. (flying) R. Ogden, A. A. Rollo, R. B. Stockfis, H. Burrows; (social) N. N. W. Bradpiece, Mrs. B. Emery, Miss J. Isaacs.

THE Bernay factory of Société Aéronautique Normande (whose activities are among those described in an article on pages 93-95) is now concentrating on the production of the three-seat DR.100 Ambassadeur and the four-seat D.140 Mousquetaire. The fourteenth of an initial batch of 50 Mousquetaires was delivered at the end of last month, and the batch will be completed by the end of May; and firm orders have been received for 50 DR.100s. Manufacture of Jodel D.117 two-seaters was transferred on January 1 from Bernay to Société Alpavia at Tallard Aerodrome, Gap, who will produce these aircraft at an initial rate of two per month under the direction of MMs. d'Assche and Noin.

THE Netherlands Government Civil Flying School at Eelde, near Groningen, is reported to have chosen the Saab 91D Safir as its new single-engined training aircraft, and delivery of 18 of these machines is expected to begin in the spring. As reported in the account of a *Flight* visit to the school in our issue of May 24, 1957, other types under consideration have been the Beech Mentor and the Piaggio P-149. The single-engined trainers employed to date have been Tiger Moths, Harvards and Saab 91A Safirs.

OXFORD Aeroplane Club are adding a Proctor 3 to their fleet to cater for advanced training and touring. The club's annual dance is planned for Friday, February 20, at the Bear Hotel, Woodstock.

NEWLY appointed general manager at Lasham Gliding Centre is Lt-Cdr. Dennis Lough, who succeeds Lt-Cdr. A. J. Phillips. Among current projects at Lasham is the construction of a second hangar to house tug aircraft, gliders and ground vehicles.

Martin Tips displays fuselage framework (as supplied to kit-builders) of the Fairey Tipsy Nipper, described in an article on pages 93-95

Radio Distress Beacon

A PROMISING CANADIAN CRASH-LOCATOR

AEROPLANE crashes are, in general, becoming increasingly disastrous. Owing to the high speeds involved, demolition of the aircraft is becoming progressively more frequent and it is often the case that no conscious survivors are left at all. For a considerable period, the National Research Council of Canada have been investigating possible systems whereby the location of a crash can be determined precisely and rapidly, irrespective of whether or not anybody on board the stricken machine can offer any assistance. From a wide range of possible solutions it was decided to choose a radio beacon; this provides a long-range, high-altitude, accurate, all-weather means of detection using a light-weight, non-hazardous apparatus which can be carried by all aircraft. A recent report (N.R.C. report MR-22, by H. T. Stevinson and D. Makow) describes the development of the beacon. The search equipment is not dealt with, since it is considered that the SARAH system, developed by Ultra Electric and widely used by the R.C.A.F., is completely satisfactory.

It was essential to evolve a beacon which can be carried by any aeroplane, which can operate for several days in ambient conditions ranging from arctic to tropical and which can be delivered safely from a crashing aircraft. The last-named requirement implies deceleration of a very high degree (but still only a fraction of that to which most portions of the aircraft and its equipment are subjected). Moreover, the beacon requires a fast-acting crash detector and on/off switch, and ability to operate after alighting on a surface which can be hard, soft, liquid, rough, smooth, flat or slanted, or covered in deep snow.

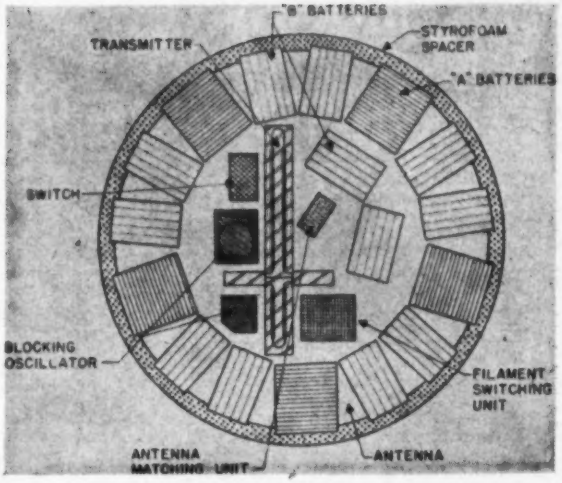
The solution decided upon employs a very light, flat, pulse-modulated transmitter distributed across a thin parallel-plate aerial. This package is then potted in tough plastic foam forming a dome-shaped aerofoil section, completely covered with a laminated skin of nylon fabric and polyester resin.

Upon receipt of the earliest possible symptoms of a crash this device is released, whereupon it tumbles away, rapidly decelerates to a safe landing speed, absorbs its own landing shock and, regardless of its orientation, transmits a signal for several days. It also behaves as a snow-shoe, and in water floats with 85 per cent of the package exposed to maintain the internal aerial clear of the water or muskeg. It is expected that transonic and supersonic aircraft would employ a sharp-edged model so mounted in a shallow depression as to produce no modification to the exterior profile. After release, the beacon forms a tumbling aerofoil. By suitably placing the centre of gravity the device can be made to continue to rotate rapidly after release, while at the same time generating an average overall lift to curve it away from the wreck.

An accompanying sketch shows the radio beacon, without its surrounding shock-absorbing aerofoil. The aerofoil is 28in square and 5 to 6in thick at the dome. It weighs 11.5 lb and carries a 5 lb beacon which will operate for 84 hr at −40 deg F. The beacon itself is powered by a 16V battery consisting of twelve nickel-cadmium cells, a 1.3V filament supply being provided by five ni-cd cells in the diagram (respectively B and A). The parallel line push-pull transmitter is placed in the centre, and employs two miniature triodes which are tightly closed by a metal foil which makes contact with the upper 14in aerial plate. For an assumed acceptable mean range of eight miles, the required peak output is 3.2W.

A total of 104 experiments had been carried out when the report was written. In simulated crashes 11 tests employed models hung from a car, 32 models were dropped from a 200ft tower and two were fired into the base of a cliff from rocket sleds. The first sled firing used a 7½ lb tumbling beacon mounted in a socket with an outside profile simulating the skin of an F-86 Sabre aft of the starboard dive brake. Deployment was initiated by a bank of coiled springs when the sled was travelling at 120 m.p.h. Failure of the last attachment slipper to unlock caused a shock which tore the socket apart and released the beacon about 50ft from the point at which the sled nose met the cliff; the beacon flew about 20ft vertically and 70ft horizontally and landed unharmed at about 13 m.p.h. near the top of the cliff. The second sled was fitted with a redesigned flat-domed beacon which was released—again not quite according to plan—at about 230 m.p.h.; the beacon tumbled rapidly up to a height of about 60ft, clearing a horizontal safety fence by a wide margin and landing almost unscratched on the rear face of the hill.

In the next phase of development, eight beacons were released from aircraft, most trials involving Beech Expediters (Twin-Beech, Model 18) at speeds up to the maximum allowable of 227 kt in dives. No trim or speed change could be detected with certainty in any drop. After investigating release while taxying at 80 kt, flying at 90 kt at 5,000ft and diving at 140 and 227 kt, two drops were made with a more powerful beacon at 160 kt from a height of 150ft on to a snow-covered hillside forested with pine-trees. In both the latter cases the beacon came to rest entirely above the snow, worked normally until shut off and gave full R.F. output when subsequently measured in the laboratory. Finally 49 range-test search flights were made with Expediters (one equipped with SARAH) at around 9,000ft. At the time of writing, 70 miles could be obtained under the most favourable conditions, ten to 30 miles under good conditions and at least five miles under the most severe conditions, in each case with complete reliability. Greater ranges are now being obtained with a more powerful push-pull beacon.



General arrangement of the beacon transmitter. Around it is arranged a protecting envelope of foam, with a lifting-aerofoil profile

Total experience with the Expediter has demonstrated the satisfactory operation of all parts of the system. It is expected that a tumbling beacon mounted above the tail and fitted with trigger wires on the nose and wings would survive a wide range of possible crashes with this type of aircraft. On larger aircraft it may be necessary to have a second beacon on the under-surface for use during upside-down impacts. The system has not been deployed beyond 260 m.p.h. or shocked beyond an estimated 70g impact, but experience indicates that the beacon will stand much more severe landings than any so far made. The filament-pulse signal aids immediate recognition and reduces battery requirements by a factor of at least two.

Several other types of radio beacon for locating either crashed aircraft or survivors have recently been developed for civil use, but it is worth noting that an entirely different line is being followed in providing built-in clues to help determine the cause of accidents. The American Federal Aviation Agency (formerly the C.A.A.) has stipulated that all turbine-powered civil aircraft operating at heights above 25,000ft shall carry a tape-recorder making a record of the main flight parameters, such as speed, height, acceleration and heading. As far as possible, the unit should be indestructible, in order to survive a crash. A similar regulation has been proposed by the French authorities.

CANADIAN INDUSTRY'S FUTURE

WHEN Mr. James Young, founder and chairman of the Canadian Pratt and Whitney Aircraft Co., retired on December 31 at the age of 75, he said that the Canadian aircraft manufacturing industry was entering a period of change which would probably see it employing fewer people in the future on the building of aircraft owing to the shift towards missiles. But he foresaw a great increase in all forms of civil flying and a corresponding growth in the facilities necessary for it, though there would be a continuing military need for reconnaissance and transport aircraft.

Mr. Young, who founded Canadian Pratt and Whitney thirty years ago, commented that his firm was unique among Canadian aircraft manufacturing companies (apart from de Havilland Canada) in that it did a large export business of about $20m a year, trading with 50 or more countries and earning a large amount of U.S. dollar exchange. The company had only ten employees when Mr. Young started it in 1928; it now has two big plants on the south shore of St. Lawrence, facing Montreal, and about 2,000 men and women on its payroll.

Aeronautical Bookshelf

Aircraft Annual 1959, edited by John W. R. Taylor. Ian Allen Ltd., Hampton Court, Surrey. Price 10s 6d. Illustrated.

THIS new edition of *Aircraft Annual* is probably the ideal book for the man who, interested in aviation yet not immersed in it, wants to know what is going on in the fast-moving aeronautical world. "Aviation at the Cross-roads" proclaims the heading of the first chapter. Aviation, like the French Republic, often is; happily, though, both institutions manage to survive. This book helps to signpost the way ahead (even if it be into the stratosphere), stimulates the aeronautical traveller, and equips him for further study if he has a mind for it.

In these days politics cannot be completely left out of the aviation picture, and Air Marshal Sir Robert Saundby grasps the nettle, though gently, in his chapter "Control by Air Power." He writes: "Since Suez our chances of being able to use it [air control], or even to defend our rights if challenged, are much less good than they used to be. No doubt this political weakness will pass, and we shall have to resort to force on occasions in order to maintain our rights. If so, we shall find, as in the past, that the methods of air control will prove to be humane, efficient, and economical."

"Behind the P.1B," another noteworthy contribution, presents the little-known story of the English Electric Company, giving a timely reminder that this great enterprise "have been building aeroplanes by the thousand since 1911." In other words, the Canberra and the Lightning didn't just happen.

"The New Luftwaffe," by ex-Luftwaffe major Hans Otto Boehm, tells the story of the rebirth of the German Air Force. It is more detailed and informative about NATO's new air partner than anything we have seen in German publications.

More than 100 photographs illustrate this lively annual, and the introduction of colour is a welcome innovation. A. J. W.

Hitler's Pilot, by Lt-Gen. Hans Baur. Frederick Muller Ltd., 110 Fleet Street, London, E.C.4. Price 18s.

THERE is much in this book to interest the war historian—one imagines that even a Trevor-Roper would be able to discover hitherto unrevealed facts—but for the reader whose primary interest is aviation it is curiously unsatisfying. Nor does the translator seem happy in the more technical passages, and his constant use of the journalese word "plane" is irritating.

This is the autobiography of Lt-Gen. Baur, a pilot of the Kaiser's War and an airline captain from 1919 onwards. He gives an impression of Teutonic stolidity and humorlessness, particularly in recounting (with no excess of modesty) his achievements in pioneering various D.L.H. services in the inter-war years.

He first met Hitler in 1932, when the Führer-to-be chartered a Rohrbach from D.L.H. for an election tour. In the following year Baur became his personal pilot; and in 1934-35 he organized a unit of six Ju 52s which was to grow by 1943 to a communications flight of over 40 aircraft—Ju 52s, Fw Condors, Siebels, Fieseler Storchs and Heinkel He 111s.

Most of the Nazi hierachy, as well as the Führer himself, flew with Baur at one time or another—among them Hess ("the man I liked best as a passenger") and Goering ("I took over while . . . he steadily ate his way to Munich"). In 1939, of course, every flight was a victory march. When Gen. Fritsch had been killed by a Polish bullet, "Hitler briefly expressed his regret, and then got back into the plane and gave the order for the take-off. With a fighter escort we now flew over the front lines at a height of between six and seven thousand feet, and we could easily see the devastation being caused in the suburbs of Warsaw. After cruising around over Warsaw for about thirty minutes we returned to our landing-place. . . . A few days later, Poland as a whole surrendered."

But slowly, inevitably, the grim edifice began to crumble:—

"In September 1943 I flew Hitler to Insterburg, where the latest models produced by the German aircraft industry were demonstrated to him. Practically all the high-ups were present, including Goering, Milch, Körner, Professor Messerschmitt and Professor Tank of the Focke-Wulf concern. First of all we were shown rocket-firing planes, and then two types of jet, a bomber and a fighter; the formal part of the affair was concluded with a demonstration of the so-called Rotterdam radar apparatus. . . .

"Goering immediately agreed to let me have [one of the new Ju 290 transports] but then changed the subject at once. Messerschmitt, it appeared, had undertaken to manufacture a thousand jet fighters by the spring of 1944, by which time it was supposed that the Allies would launch their invasion. Goering then went on to say that all the necessary material was available, except the nickel for the turbines. Only recently, as Hitler knew, all available stocks of raw materials, including nickel, had been apportioned, so that unless other arrangements were made there would not be enough nickel for the jet fighters.

"When Hitler, Goering and I got out of the Ju 290, Messerschmitt and Milch were waiting on the ground. Hitler confirmed from Messerschmitt what Goering had said, and then declared: 'Very well, I'll see to it that you receive the nickel; you see to it that you produce them. The jet fighter is enormously important.'

"But February 1944 arrived, and then March—but the jets did not. In the meantime the German fighter arm was running into more and more trouble. The bomber hosts invading Germany were growing larger and larger—on some days between three and four thousand planes flew in—but there were no jets to meet them. No one knew why, though there were many rumours. Something was wrong in the Air Ministry, it was said. In any case, a little later Milch was deprived of his post."

And so to the ultimate squalid scene in the Berlin bunker, in which Baur was a participant. It is only in the final chapters, in which he describes his treatment by the Russians, that the ex-D.L.H. captain who became Hitler's confidant begins to emerge as a flesh-and-blood figure for whom the reader can feel some sympathy. R. E. C.

Handbook of the Aircraft Industry, edited by J. L. Nayler and T. F. Saunders. George Newnes Ltd., Tower House, Southampton Street, Strand, W.C.2. Price 35s. Illustrated.

THIS is more of a bedside or office desk companion than a reference book. Finding it impossible to pack into a single volume all the facts and figures which would make it a work of reference, the editors have chosen subjects embracing the industry in the widest sense, and which will remain factually correct for a few years at least. The book will need to be regularly kept up-to-date if it is to be of lasting value, although today its information is reliable and informative.

There are some outstanding contributors—Sir Arnold Hall on aviation engineering as a career; Professor A. J. Murphy on aeronautical education and training; and Maurice Imray with a chapter on records, explaining the sporting code of the F.A.I.

Only one complaint—in places the book seems a little overwritten. We are told that there are "several supersonic research aircraft" flying in Britain. This reviewer can recall only the F.D.2 and the P.1A. Why not say there are just two? On page 228 there is the slightly unnecessary information that two of the boosters on the Bristol Bloodhound have the word "Bristol" painted on them! A. C. B.

OTHER BOOKS RECEIVED

High Altitude and Satellite Rockets (Symposium held at Cranfield, July 18-20, 1957). Royal Aeronautical Society and the British Interplanetary Society. Price 32s 6d.

Rockets and Satellites, edited by L. V. Berkner. Pergamon Press, 4 and 5 Fitzroy Square, London, W.1. Price £8.

American Aces of World War II, by Edward H. Sims. Macdonald and Co. (Publishers) Ltd., 16 Maddox Street, London, W.1. Price 18s.

Aviation Medicine—Selected Reviews, edited by Clayton S. White, W. Randolph Lovelace II and Frederic G. Hirsch. Pergamon Press, 4 and 5 Fitzroy Square, London, W.1. Price 70s.

Brassey's Annual, 1958, edited by Rear-Admiral H. G. Thursfield. William Clowes & Sons Ltd., Little New Street, London, E.C.4. Price 63s.

Air Intake Problems in Supersonic Propulsion (11th AGARD Combustion and Propulsion Panel Meeting, Paris, December 1956), edited by J. Fabri. Pergamon Press, 4 and 5 Fitzroy Square, London, W.1. Price 30s.

Great Escape Stories, edited by Eric Williams. The Heirloom Library, Weidenfeld and Nicolson, 7 Cork Street, London, W.1. Price 12s 6d.

Factories and Plant (History of the Second World War), by William Hornby. Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London, E.C.1, and Longmans, Green and Co. Ltd., 6 and 7 Clifford Street, London, W.1. Price 37s 6d.

Annual Report of the Smithsonian Institution, 1957. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $4.50.

Bluey Truscott, by Ivan Southall. Angus and Robertson Ltd., 105 Great Russell Street, London, W.C.1. Price 18s.

Aeromodeller Annual 1958-59, compiled and edited by C. S. Rushbrooke, F.S.M.A.E., and D. J. Laidlaw-Dickson. The Model Aeronautical Press Ltd., 38 Clarendon Road, Watford, Herts. Price 10s 6d.

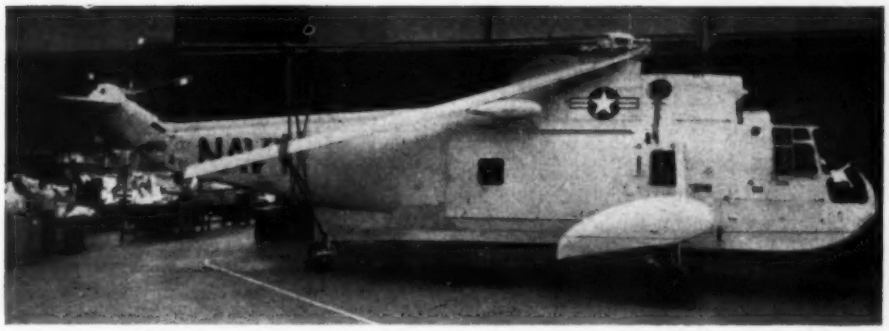
Who's Who in World Aviation and Astronautics, Vol. 2. American Aviation Publications Inc., 1001 Vermont Avenue, N.W., Washington, 5, D.C. Price $12.50.

EARLY FLYING BOOKS

CLAIMED to be the only publication of its kind current in England, a catalogue of rare and out-of-print books on aviation has just been issued by C. G. B. Stuart, of The Hall, Fairlight, Hastings, Sussex. Mr. Stuart states that his stock of out-of-print aviation books, totalling over 20,000 items, is the world's largest.

Evident from the catalogue is the growing interest in early aviation works, particularly those devoted to the World War I period. Mr. Stuart also catalogues an interesting collection of U.S.A.F. pictorial, group and squadron histories, produced only in limited numbers.

Above, the Umbaugh Model 18 two-seater autogiro, designed for a cruising speed of 100 m.p.h. Upper right, the amphibious Sikorsky S-62



Another Sikorsky amphibious helicopter is the forthcoming S-61, illustrated on the right in mock-up form

NEW SHAPES UNDER ROTARY WINGS

DESIGNATED Umbaugh Model 18, the little two-seater autogiro depicted at top left is claimed to take off vertically and to land at 10 m.p.h. or less. A cruising speed of 100 m.p.h. is mentioned, together with a top speed of 126 m.p.h. and a "total operating cost" of six cents a mile. The illustration appears to show a model or mock-up.

Alongside the first picture is a recent view of the Sikorsky S-62 amphibious helicopter, powered with a General Electric T58 shaft turbine unit of 1,050 h.p. (being constructed in this country as the de Havilland Gnome).

The third illustration shows the mock-up of the Sikorsky S-61 (U.S. Navy designation HSS-2), again with amphibious characteristics. A prototype is under construction and is scheduled to fly this year. Two General Electric T58s are specified, mounted side-by-side above the fuselage. The makers say of the S-61: "The new aircraft will combine the reliability of existing production parts and twin engines with the versatility of its universal alighting gear and large cabin convertible to assault and utility use. The Marine Corps version of the HSS-2, to be known as the HUS-2, will be used as a troop carrier. A cargo sling for lifting up to 6,000 lb and a 600-lb rescue hoist are among the special equipment which may be installed if the new helicopter is used for transport or rescue work." The production machines may have a pair of the new G.E. T64 engines, each of 2,600 h.p.

LIQUID-PROPELLANT COMBUSTION RESEARCH

COMBUSTION research in liquid-propellant rocket motors was the subject of a lecture given before the British Interplanetary Society on January 3 by Mr. Dennis Carton of the College of Aeronautics, Cranfield. The lecturer discussed the processes which had to occur all together in a rocket chamber, and indicated how research on specific aspects of combustion, such as the evaporation and burning of droplets, and the calculation of the composition of the combustion end-products, was providing a better understanding of the whole phenomenon.

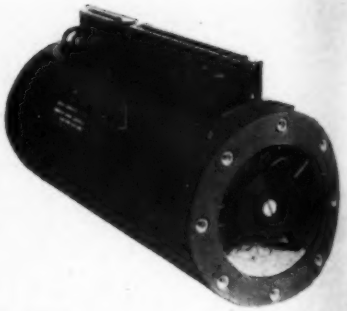
Some rather spectacular high-speed cine stills were shown of combustion instabilities in experimental motors in the form of thin slices of real combustion chambers, fitted with transparent sides. These, made by Rocketdyne, showed the development of lateral oscillations across the flame from a shower-head injector, with combustion alternately intensified and suppressed at either side of the chamber. A study of the ignition phase showed that, although a smooth light-up appeared to have been achieved, there must have been sufficient unburnt propellants in the chamber to give the sudden intensification of combustion, some milliseconds after initiation, characteristic of a hard start.

A high-speed colour film of two- and three-dimensional flame studies made by Typaldos at JPL showed, in considerable detail, some of the phenomena occurring in small transparent-walled chambers operating on RFNA and ammonia. Shower-head injectors showed persistent stratification along the chamber, even when the propelling nozzle was placed as much as 15 diameters from the injector, while impinging-jet injectors, even though accurately made, were seen to give mixing of the propellants that was far from perfect. In both systems, combustion oscillations and gas recirculation could be discerned: even where injection occurred almost uniformly across the chamber head, recirculation still took place between the flame and the chamber wall.

Coming nearer home, Mr. Carton showed that the College of Aeronautics is not idle in its treatment of rockets: he described an interesting pressure transducer, in which the measuring system (a strain-gauged tube) is called upon to determine only the difference between the test pressure and an accurately-known reference pressure. Accuracy of better than $\pm\frac{1}{2}$ per cent, and linearity up to 1,000 c/s., were claimed.

A technique recently evolved at the College appears to have useful applications for rocket engineers, as well as giving promise of being a useful tool for combustion research proper: by placing a molybdenum plate, coated with the hard-surfacing material Rokide A_4, longitudinally in the chamber, the flow lines and regions of intense combustion activity are made apparent by permanent changes in colour and by surface melting in the coating. The method gives a far clearer picture of the flow in a real chamber than could be provided even by a great deal of probing.

The new G.E.C. signalling lamp, described below, in use in the control tower at Gatwick



On the right is the Plannair heater Type 2,000-347H, as used to warm the atmosphere of the Comet 4's flight deck. Operating on 28 volts D.C., it contains four banks of 0.5kW elements, which can be switched-in independently. Thermal cut-outs limit the elements to a temperature of 450 deg C

THE INDUSTRY

Lightweight Signalling Lamp

ILLUSTRATED in the heading is a recently introduced lightweight signalling lamp by the General Electric Co. Ltd., of London, W.C.2. Having a maximum intensity of 130,000 candelas produced in a narrow beam by a 6V 45W bulb in an anodized aluminium reflector, it is stated to have been successfully tested by transmitting signals over a distance of four miles in bright sunlight.

Of 7in diameter and 7¼in barrel length, the lamp weighs only 4½ lb and can therefore be easily used in the hand, though it can alternatively be suspended from a control-tower ceiling by a counterpoise device which allows it to be operated at any height between 4ft and 9ft from floor level. Refinements include a trigger-operated morse shutter and handle-actuated red and green colour screens. The colour in use is indicated to the operator by means of an aperture near the eye-piece of the sighting unit.

New Esso Chairman

FORMERLY a managing director and chief executive of the Esso Petroleum Co. Ltd., Mr. H. C. Tett has been appointed chairman and managing director from January 1, following the retirement of Sir Leonard Sinclair.

Mr. Tett, who is a B.Sc. honours physics graduate and also holds an Imperial College diploma for research work on combustion and tetra-ethyl lead, joined Esso Petroleum in 1928 as an assistant in the company's technical sales department. He became manager of the department in 1935 and in 1939 transferred to the International Association (Petroleum Industry) Ltd., where he was engaged in the co-ordination of technical matters relating to European sales of the Esso organization.

During the war years Mr. Tett served on the Petroleum Board's technical advisory committee, the Aviation Supply Committee and the Inter-Services Co-ordination of Specifications Committee. He also joined M.A.P. missions to the United States concerned with 100-octane fuels and in 1945 was commissioned as lieutenant-colonel for intelligence work on scientific targets in Germany. When the Esso Development Co. was formed in 1947 to co-ordinate Esso group research and development in Europe he was appointed managing director, holding this post until 1949 when he became general sales manager of the Esso Petroleum Co. In 1951 he was appointed a director of the latter company, five years later becoming a managing director; then in 1957 he assumed the duties of chief executive of the company.

Spreading Brightness Abroad

THE ever-increasing totals of exports by the British aircraft industry consist primarily of aircraft, engines, components, electrical equipment and tyres. There are, however, many firms whose products fall outside these categories and cannot therefore be included in the official statistics of exports—this despite the fact that a very large proportion of the total business of the companies concerned is identified in one way or another with aviation.

A case in point is that of Valay Industries Ltd., whose aircraft-cleaning compounds and materials are well known. Perhaps the best known is Wadpol, an impregnated polishing wadding, some 80 per cent of the total production of which goes abroad, much of it for hard currency. Many American orders have stemmed from the fact that Wadpol has been in use for some time past for cleaning the Presidential aircraft. At home it is used for the aircraft of the Queen's Flight, and overseas air forces which favour it include those of the U.S., Venezuela, Norway, Canada, Australia, New Zealand, Pakistan and India. B.O.A.C. and a number of British manufacturers use it, and among foreign airlines which have placed orders are Trans-Australia, El Al and Lufthansa.

Other products of Valay Industries (whose H.Q. are at 186 Campden Hill Road, London, W.8) include Aerowax polish for high-speed aircraft; Aerowash, for removing grease and grime; and Aeroval for interiors.

IN BRIEF

Mr. Howard V. Potter retired as chairman of Bakelite Ltd. on January 1 but will continue as a director of the company. He is succeeded in the chairmanship by Mr. Stanley Adams, who has been vice-chairman since 1948.

* * *

S/L. Denis Dickson has recently been appointed to the Board of H. and D. Churchill Ltd., manufacturers and distributors of machine and hand tools and one of the Charles Churchill group of companies. He was formerly general sales manager of Gerrard Industries Ltd. and Gerrard Safe Seal (Overseas) Ltd.

* * *

Mr. George S. Sanders, B.Sc.(Eng.), A.C.G.I., A.M.I.Mech.E., has been appointed head of the newly formed group productivity services department of the Solartron Electronic Group Ltd. He was formerly with the management consultant firm of Urwick, Orr and Partners Ltd., joining Solartron recently to establish and organize their new department.

* * *

Mr. Cecil Dotson of Dallas, Texas, has been appointed chairman of the Board of Texas Instruments Ltd., Bedford, the first European subsidiary of the American organization Texas Instruments Inc. An extensive new plant for the English company—said to be the "largest manufacturers of silicon semiconductors in this country"—is planned for a site of 240,000 sq ft at Hoo Farm, Bedford. Building is to start early this year and by 1963 it is estimated that 1,400 people will be working for the company.

* * *

Mr. Percy Hobourn retired on January 1 from the managing directorship of Hobourn Aero Components Ltd., a company in the Thomas Tilling Group, but remains its executive chairman. He has been succeeded as managing director by Mr. R. H. Howe.

* * *

Westway Models Ltd., specialists in airliner and other models for display purposes, are now in their new premises at 178 Brent Crescent, London, N.W.10 (Elgar 3267). A modern single-storey building of 8,000 sq ft area, it at present accommodates some 35 model-makers, leaving room for considerable further expansion.

* * *

We regret to record that Mr. R. Moxham, manager of the G.E.C. factory at Broad Oak, Portsmouth, died on Christmas Day at the age of fifty. He was largely responsible for the rapid growth of the Broad Oak factory, where precision electronic work is carried out, having been asked in 1953 to take the lead in planning it and been appointed manager the following year. He had joined G.E.C. in 1933 and during the war was engaged in major development work on V.H.F. equipment for the R.A.F.

CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. The names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

"Flight's" Jubilee

MY sincere congratulations to *Flight* on attaining its golden jubilee. As a schoolboy of 15 I well remember seeing *Flight* for the first time, and buying my first copy for *one penny* at a bookstall in the Court of Honour in the Franco-British Exhibition at the White City during my school holiday in August 1909, just after Blériot had flown the Strait of Dover. I seem to remember that a Blériot monoplane—it may have been the actual one— was on show at the White City.

I bought *Flight* eagerly every weekend after that, and had a subscription, so it was sent to me at Tonbridge School. There was a feature then, "From the British Flying Grounds," where I first read of pilots who later became famous, such as Tommy Sopwith, Frank McClean, Gustav Hamel and many more. And I loved the full-page g.a. drawings of current aeroplanes. I had my first flight at Farnborough in 1912 with Mr. (now Sir) Geoffrey de Havilland in the pusher biplane of which a photograph appeared in the D.H. advertisement in your jubilee issue, when I was an O.T.C. (not A.T.C.!) cadet in camp where the runway now starts.

In those days we boys devoured *Flight* with the same zest as boys of today read space travel fiction. Flying was just beginning to emerge from fiction into fact.

London, S.W.5. GEOFFREY DORMAN.

[Our thanks to Mr. Dorman for his appreciation, and to other readers who have written in similar vein—Ed.]

Speed and the Airline Passenger

HOW right J. R. Howard is in his letter on this subject in your issue of January 2. I have flown, or been flown in, some hundreds of aircraft types—from Moths in 1930 to Friendships last month; and, of all, from a passenger angle, I have nostalgic memories of flying-boats—particularly the Solent. Unfortunately the day of the boat is behind us at present, but similar characteristics on wheels are within reach and would, I am sure, have a wide appeal.

I do not think that less time exposed to boredom is the only parameter in favour of jets. The finest, fastest and firstest has a tremendous appeal—much of it snob value!—and this will, I suppose, always attract its habitues, be they film stars or first-timers. The traveller to whom such snob-value has no appeal would be more than satisfied with the type of operations your correspondent describes. On the Atlantic, or other long ocean routes, he wants a sleeper, and, if he gets that at the right price, would probably prefer a ten-hour crossing to a six. In busy traffic areas he has got to fly Airways anyhow, but the time through these areas is short and he avoids boredom; even though his speed is no more than, say, 260 knots. For the rest of world routes, as your correspondent suggests, there are fifty passengers who would prefer the "scenic" way for every one in a blind hurry. But why not a bar? It passes the time and pays the wages.

The Argosy looks ideal for this short-haul rôle, provided it is quiet; and what about the Britannia—fully sleeperized—for the long-haul?

Liverpool, 17. W. M. HARGREAVES.

Memories of Hindustan

IN his article "Around Hindustan Aircraft" (December 19) Mr. Pugh refers in para. 4 to the methods used in obtaining spares, etc., for the reconditioning of war-surplus C-47s in the immediate post-war period at Hindustan; and, as he so rightly says, there is a really intriguing story behind the bald statement. At this time, as a Government of India Officer, I was seconded to Hindustan and served for a time as commercial manager. In this post I had to explore all ways of procuring spares, raw materials, etc., to enable the C-47 conversion line to carry on. One of our many difficulties was the fact that Bangalore, being a semi-hill station, was served only by a narrow-gauge railway up from the plains, and all materials had to be off-loaded from main-line trucks and reloaded for the narrow gauge. Then, again, I soon found that the stores of spares and raw materials were located throughout the length and breadth of India and Pakistan—for example: radio and electrical instruments, Calcutta area; airframe spares and propeller spares, Cawnpore; dopes, varnishes, lubricants, Bombay; Tiger Moth spares, etc., Karachi.

During the period 1946-47 the only way we could keep going was to send representatives or go personally and process these various "dumps," and most trips meant journeys of up to 1,200 miles. I flew myself on many of these journeys. It became commonplace to leave Bangalore at 0330 hr, arrive Cawnpore 0900 hr, load up with spares and leave again at 1230 hr, back home for dinner at 1800 hr—2,400 miles often under monsoon conditions, with few, if any, aids to navigation, and maps that showed a thin blue line for a river which in fact might be ten miles wide during the monsoon. There were, too, large drums of dopes and thinners, gassing at 7,000ft, and other hazards. Still, it was worth it, and the 1,500-odd operatives were in the main kept busy, although sometimes it was a question of immediate unloading spares, quick inspection and release to the shops.

Why did we airlift? Because, after ordering parts, etc., it would mean anything up to three or four months before they would arrive by rail or road. Our most difficult time was from May 1947 to November of that year, due mainly to communal difficulties prior to, and subsequent to, partition. In this period I myself flew some 346 hours (usually acting as second pilot).

The best of fortune to Hindustan; we who have returned to England still remember the teething days and admire them for the steady progress they have made and are making.

Corby, Northants. W. P. TYRRELL.

Cockpit Conservatism

I WAS delighted to read Cdr. Goodhart's article "Conservatism in the Cockpit," in *Flight* for December 26. It brought back memories of days just after the war when I cycled out from Cambridge to Bourn to attempt my first ground slides in a Cadet glider.

The confusion between my bicycle handlebars and the Cadet's rudder bar was very real and brought near-disaster to both means of transport in turn. I felt that I received less than my share of sympathy from the ex-bomber types with "thousands of hours in," and was left to work out my own salvation.

So long as I regarded the thing in the Cadet as a rudder bar I remained incapable of operating it in the correct sense without a preliminary period of unhurried, undistracted thought. One day I realized that a tracked vehicle is steered (in some cases) by putting on either a left brake or a right brake and looked forward anxiously to trying out this new approach on the Cadet.

It worked perfectly. My delight at being able to ground-slide the whole length of the runway under "natural" directional control, using my "left brake" or "right brake" as required, is a very happy memory. I have often wondered whether other people found the same difficulty and whether my solution would suit any of them.

Farnborough, Hants. LAURIE VANDOME.

A.T.C.O. Employment Conditions

THE article by L. F. E. Coombs, "The Traffic Control Problem" (December 26) I found very interesting, although I think the present staffing difficulties in Air Traffic Control, caused in most cases by conditions of service and lack of secure future, are a major problem.

M.T.C.A., M.o.S., and all other reasonably paid jobs have age limits of 35. M.T.C.A. have at least 100 vacancies at the present time. In practice this means a man can no longer seek promotion elsewhere after 35, and this leaves a lot of frustrated individuals in the prime of their working life. How many other professions consider a man too old at 35? Normally he is just maturing in experience and becoming most valuable to his employers. Further, it seems absurd to employ (as M.T.C.A. do) a person of up to 35 without any A.T.C. experience, spend heaven knows how many hundreds of pounds, and hours, on training him to proficiency, when an experienced A.T.C.O., of say, ten years' experience, at 36 years of age cannot be employed. Surely some form of age reduction for experience would bring many more A.T.C.O.s into Government appointments. If the employers are worried about pensions, an offer of reduced pension or permanent un-established appointments will still produce results.

I am over 35, and in the last two years have applied for about 25 appointments and received only one interview. In some cases I have checked the selected candidates' qualifications and found them much less than mine. It would appear that in some cases I am too well qualified. After 18 years in aviation (13 in Control) I am seeking employment elsewhere because there simply isn't the scope or future in Air Traffic Control there ought to be. A.T.C. can be a thankless job, often in very poor working conditions (i.e., in radar units) on shift hours through 24 hours, weekends, nights and Bank Holidays. Medical examinations every year can be very worrying, as a failure can mean unemployment and a severe drop in one's living standards and salary.

I sincerely believe that an independent committee should be set up immediately to investigate Air Traffic Control in the United Kingdom, including employment and conditions of service. Civil

CORRESPONDENCE . . .

A.T.C.O.s should be, in all cases, a completely independent body, and not remain under normal Civil Service procedures; this would iron out a lot of the present difficulties existing (e.g., a five-day week, which no working Grade A.T.C.O. enjoys, in the sense of Saturday and Sunday off each week. Public holidays in lieu do not completely compensate for periods worked—last Christmas, for example, when most normal Civil Servants finished Wednesday noon and returned Monday morning).

It seems entirely wrong to me that a pilot of a public transport aircraft must be licensed, and yet may well be controlled at some airports by A.T.C.O.s, in I.M.C. conditions, who are unlicensed (licensing is not yet compulsory). M.T.C.A. have had plenty of time to introduce licensing, and have not yet done so, although I am aware of the hard work put in by the Guild of Air Traffic Control Officers in this direction, and that it will be introduced about 1960; the time is ripe now—A.T.C.O.s have had plenty of time and warning about this.

Let me end with a thought for 1959. The military and civil aircraft air collision in Italy could be repeated in this country now, under the present system; remember, we have not one A.T.C. system but at least three—M.T.C.A., R.A.F., and U.S.A.F. The United States have tackled the same problem by an immediate formation of a new overall authority in F.A.A. Let us follow suit now, before the summer traffic starts, with legislation as necessary, and not wait until our near-miss and accident totals are as high as theirs. V.M.C. in Airways is stupid and solves nothing, but simply allows buck-passing to an already overloaded pilot responsibility list.

London, W.1. LA DELUGE.

Croydonization

I WAS shocked to read in recent issues of *Flight* that Southampton Airport is at the top of the short list for Croydonization. What folly is this that is besieging our airports? Indeed, if one examines the reason given, it would seem that they apply to 90 per cent of all airfields.

The annual loss on Eastleigh is quoted at £145,000. May we be told how this figure is derived? Surely revenue from the airfield premises housing active industrial concerns must go a long way to supporting the airport's overheads, or is Eastleigh blessed with excessive luxuries? Could it be that the rates levied on the place are unrealistically high and inability to meet these is regarded as a loss?

We live in an age which thinks in terms of continuous development and expansion, but is this really necessary? Does not Eastleigh serve adequately the only sort of aircraft ever likely to use it? As for the railway development scheme which it is said prevents the runways being lengthened, we all know the colour of our railways' balance sheet, which leaves little doubt as to who will pay for that, if ever it receives approval.

With the growth of population and the saturation of surface transport, it is a short-sighted policy to destroy the few remainin centrally situated airfields, however small.

Those responsible for the future of Eastleigh might do well t take a leaf out of Southend's book.

Gerrards Cross, Bucks. MICHAEL J. DIBLE.

"Party Politics" Echo

I SHOULD like to refute Mr. Alec Smith's suggestion [Correspondence, December 26] that I do not read my copy of *Flight* I do read it—most avidly, from cover to cover in fact. However, a my original letter [December 12] was written before I received th previous week's copy to which he refers, I hope I am excused o that point.

As to his second remark, I must confess with shame that I am no of the "Top People," and I cannot afford their newspaper. All m spare money is spent on aeronautical publications.

Bodmin, Cornwall. JONATHAN EASTHOPE.

Early Oddities

IN *All the World's Airships* (*Aeroplanes and Dirigibles*) *1909-10* by Fred T. Jane, I have found a reference to the Barber Monoplane and the Howard Wright biplane, both fitted with contra-prop engines. Which was the first contra-prop aeroplane to fly (with th propellers on one shaft)? And was the Howard Wright biplane th first contra-prop *pusher* aeroplane? Again, was the Humphre flying-boat the first aeroplane to be equipped with elevons?

Furthermore, do any photographs of the following aeroplane still exist?: (1) The French Vermoral Tri-drumplane; (2) th Givaudan Drumplane (also built in France)—these two have to b seen to be believed; (3) the American Kunow Flapper; and (4) th following: the Thompson, the Lake, and the Wade Air Sucke (which unfortunately are not illustrated).

Birmingham 14. MAURICE AUSTIN.

FORTHCOMING EVENTS

Jan. 16. Institute of Navigation: "Blind Landing Problems," by W. J. Charnley.
Jan. 17. Aircraft Recognition Society: All-England Contest.
Jan. 21. Manchester Metallurgical Society (Institute of Metals): "Investigation of Metallurgical Failures in Aircraft," by D. A. Ryder.
Jan. 26-29. Institute of the Aeronautical Sciences: 27th Annual Meeting.
Jan. 27. R.Ae.S.: "The Noise Problem in Relation to Engine Design," by P. Lloyd.
Feb. 5. R.Ae.S.: First Halford Memorial Lecture, by J. L. P. Brodie (at Hatfield Branch).
Feb. 6. Helicopter Association: "Some Engineering Aspects of Helicopter Assessment Trials," by H. J. Webb.
Feb. 7. British Interplanetary Society: "High-energy Fuels and Rocket Propulsion," by Dr. F. Fitzgerald.
Feb. 9. R.Ae.S. Guided Flight Section: "Theoretical Studies of Guided-missile Control Systems," by E. G. C. Burt.

R.Ae.S. Branch Fixtures (to Jan. 23): Jan. 20, *Luton*, junior paper evening. Jan. 22, *Bristol*, "Guided Missiles," by Dr. R. Cockburn; *Isle of Wight*, "Nuclear Propulsion of Aircraft," by J. V. Dunworth; *Southend*, "Modern Aircraft Production Methods."

EVALUATING INTEGRATING GYROSCOPES

APPARATUS for the precise evaluation of low-wander-rate gyroscopes has been developed by the weapons research division of A. V. Roe and Co. Ltd. The gyro under test is connected by means of flexible cable to a control rack containing the necessary electrical supplies and monitoring equipment. These include a tuning-fork-stabilized 400 c/s supply for feeding the spinner and signal generator, a heater-control circuit which holds the gyro temperature to $\pm\frac{1}{2}$ deg C. and a signal generator output-meter which gives a direct indication of gimbal angular displacement.

The gyro is mounted on an accurately designed rotating table with its axis in the vertical plane through the local meridian and which may be inclined at any suitable angle to the vertical. The table is driven through a reduction gearbox by a servo motor, the signal input of which is derived from the gyro signal generator output. The "tightness" of this loop ensures that the table rate is a faithful reproduction of the gyro output rate.

The table is fitted with an optical pick-off arranged to give a phase reversal of an A.C. signal for every 18 sec of arc angular movement. This signal is used to drive a phase-sensitive relay in such a way that a pulse output is obtained for each angular interval. Overall angular accuracy of each of these pulses is better than 1 sec of arc and the cumulative error over the full 360 deg is from 2 to 4 sec of arc.

The optical pick-off output pulses are fed into an electronic interval selector which, by means of two decade switches, can be set up to give an output pulse for every 1 to 100 input pulses—i.e., any angular interval in steps of 18 sec of arc may be selected from 18 to 1,800 sec of arc ($\frac{1}{2}$ deg).

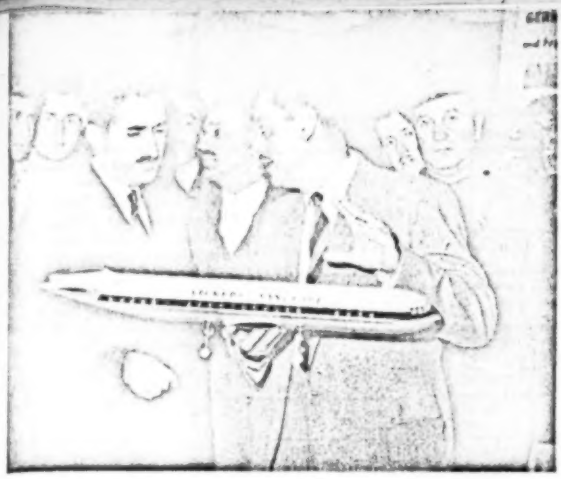
The interval selector output is used to trigger a time counter which is fed by 10 millisec pulses derived from the standard tuning-fork supply. The decimal counter has a five-digit capacity and can thus measure the time taken for the table to traverse the selected angular interval up to a maximum of 1,000 sec of time. Accuracy of time measurement is ± 1 count $\pm$ tuning-fork stability.

At the end of each count the state of the counter is automatically scanned and the resulting information fed to an electric typewriter. The counters are in fact employed so that one is maintaining the continuity of the count whilst information is being printed out from the other and vice versa. Facilities are also available for subjecting the gyro to toppling tests.

ITALIAN AERONAUTICAL FILM FESTIVAL

A SERIES of film sessions lasting up to a week have been organized in Milan by the Italian Centro di Cultura Aeronautica, whose president is the well-known pilot and writer Mane Lualdi. For a week at the end of last November the first session, held in one of the major cinemas of Milan, was dedicated to the U.S.A. The American Air Attaché in Rome presided at the showing of numerous new films on such subjects as flight testing, the launching of Explorer and Pioneer, the Thunderbirds aerobatic team, aero-medical research, Air Proving Ground Command and the work of the Air Striking Force of Tactical Air Command. Lectures on associated subjects were also delivered and the session is reported to have achieved considerable success.

This month a second session is to be devoted to Russian aviation, and the Russian Air Attaché in Rome is reported to have promised to supply a quantity of new information and films. Further sessions this year are to be devoted to Britain and France.



Inspecting a Vickers Vanguard model at Beirut is Premier Rashid Karami of the Lebanon. Holding the model is Vickers' representative, Mr. F. J. Sader. The occasion was the recent civil aircraft exhibition at the American University

AIR COMMERCE

THE MAKE-OR-BREAK CONTRACT

AFTER months of delay the hour is approaching when the Air Ministry will announce the award of the Britannia trooping contract. Tenders were issued to independent British airlines last spring, and proposals were originally intended to be completed by the summer. In the event, requirements were continually being amended and it was only in the late autumn that final plans were submitted by the carriers concerned. At one time it seemed that a decision would be announced shortly before Christmas, but further delay is not now likely.

The Britannia trooping contract had a curious origin. In 1954 the M.o.S., which owns about two-thirds of Short Bros. and Harland (the balance being held by Bristol and by Harland and Wolff), was anxious to find employment for their Belfast plant and hoped that Bristol would consider laying down a second Britannia production line in Northern Ireland. Following an order from the Ministry for three aircraft, Bristol agreed to build a minimum of eight Britannia 250s at Belfast, these aircraft having a mixed passenger-cargo configuration (the fuselage forward of the wing being specially adapted for the carriage of heavy freight). Specifications for the three M.o.S. 252s referred to a maximum payload of 31,000 lb, a strengthened freight floor, installation of a hydraulic jack (for shifting heavy equipment such as spare powerplants), and provision of stretcher points, a large freight door forward (6ft×8ft) and accommodation aft for 87 passengers.

When the Air Ministry came to issue tenders for the Britannia contract, two alternative proposals were invited from each airline. The first scheme involved purchase of the three aircraft together with aircraft-spares and ground equipment. A contract awarded on this basis would cover a five-year period dating from the delivery of the third aircraft—this would allow sufficient security to permit recovery of the initial capital expenditure, estimated unofficially at £4 million.

The alternative scheme proposed that the three aircraft be lent gratis for a three-year period and operated on the Ministry's behalf (a complex aspect of this proposal was the arrangement for financing spares). An unusual feature of both schemes was that the Ministry departed from the previous practice of inviting prices to be quoted on a "per flight" basis. This practice had provided insufficient flexibility to cover unexpected changes in plan, and both the Ministry and the operators suffered from the resulting uncertainty. To avoid such difficulties the Britannia contract will guarantee a minimum payment for a specified volume of output: this will provide the Ministry with an incentive to get as much use as possible out of the aircraft.

The same six broad tasks are enumerated in either scheme and are based on operations from Britain to Singapore, Hong Kong, Cyprus/Malta, Australia, East Africa and Aden. The hourly work-capacity of the three Britannias should be equivalent to that of eight Hermes and, when allowance is made for annual utilization rates, it seems likely that at least ten Hermes would be required to perform a similar task.

Already, across the Channel, a reduction in military demand for transport in obsolescent piston aircraft has led to the grounding of S.A.G.E.T.A. and the cocooning of their six huge Armagnacs. The fleets of Hermes and York aircraft in this country are now faced with a similar threat. Indeed, a number of mergers between British carriers are expected to follow upon the final award of the Britannia contract.

BRITANNIA PROFITABILITY

IN our January 2 note on the first year of B.O.A.C. Britannia 312 operations it was estimated that, from a break-even B.O.A.C. passenger load-factor of 71 per cent and an achieved passenger load-factor of 62.5 per cent that a loss of about £1.5 million—exclusive of mail and freight revenues—was experienced. This figure, by an error in transposition, should have read £0.5 million. B.O.A.C. comment as follows:—

"In the note on the trans-Atlantic Britannia anniversary in your issue of January 2, you have drawn assumptions which are most misleading.

"You yourself have pointed out that your statement that our Britannias lost £1.5 million on the North Atlantic was incorrect and that you intended to quote £0.5 million—but that revised figure is also misleading for, as you admit, it does not take account of mail or freight revenues.

"It is not B.O.A.C.'s practice to give detailed results of any particular route, but we can assure you that even the figure of £500,000 is incorrect when calculated, as it should be, on an overall basis of passenger, mail and freight revenues. Obviously mail and freight intended to quote £0.5 million—but that revised figure is also inaccurate revenues cannot be omitted from any assessment of our operations.

"Moreover, on the London - New York service we made a profit with the Britannia 312s. On the Mid-West of America and San Francisco services, which were in a developing stage in 1958, we did not.

"The figure for revenue daily utilization on revenue flying of 3.2 hours per aircraft, which you accurately quoted, includes that for the first four months of 1958 when utilization was very low because we had only just begun to take delivery of the aircraft. In the last eight months the revenue utilization increased to more than six hours a day.

"It must also be pointed out that in 1958 the Britannia 312s were used extensively for crew training in preparation for next summer, when we plan utilization of these aircraft of more than ten hours a day. Therefore, B.O.A.C.'s first year of Britannia activities is not disappointing, as you suggest.

"We are satisfied with public reaction to these airliners and our operations during the past year, especially on the London - New York service, make it quite clear that they are profit-making aircraft."

AEROFLOT'S SEVEN-YEAR PLAN

A SIXFOLD increase in Russian air travel was stipulated as part of Mr. Kruschev's seven-year economic programme. Marshal Zhigarev, chief executive of Aeroflot, has recently described the effects of this programme on the national airline.

To attain Mr. Kruschev's target will demand an average rate of traffic increase of 29 per cent over the period 1958-65. This will be accompanied by a threefold increase in the number of airports capable of 24-hour operation and an extension of Aeroflot's network. A trebling of staff productivity rates is also planned; it is hoped that this, together with the introduction of more economical aircraft types, will result in a reduction of unit costs of about one third. These savings, it is said, will allow fares to be reduced to the level of railway charges.

Greater emphasis will be placed on short- and medium-haul routes. This is indicated by the fact that the number of passengers is expected to increase by as much as 31 per cent annually. One aspect of this development will be the extension of helicopter services. Russia's first such service was started in the Crimea last autumn. Later this year an additional operation is planned to link Sochi and Adler, two resorts along the Black Sea.

The significance of Marshal Zhigarev's statement is difficult to establish without knowing the present levels of traffic and output. But past refusals on the part of Aeroflot to release any such information suggests that the records of present operations are less flattering than the Russians would like the outside world to suppose.

THE SILVER BIRDS OF FRANCISTOWN

WENELA provides a perfect example of the need to advertise: no sales promotion extols the virtues of its air services and consequently few people outside Bechuanaland have ever heard of their existence. But WENELA is as strange as its name: the title was invented to provide an articulate version of the initials W.N.L.A.—the Witwatersrand Native Labour Association.

Wenela Air Services provide what amounts to an inclusive tour in reverse. Instead of having to pay for an air fare, all their passengers are given a free ride, and when their destination is reached they settle down, not to a few weeks' holiday, but to many months' toil on the South African goldfields.

Wenela Air Services are operated on behalf of the Association by a South African charter company, Africair Ltd. (A number of mining houses, which support W.N.L.A., are shareholders in the airline.)

Every year thousands of Africans are attracted southward by the relatively high wages offered on the mines, and prior to 1952 a long and arduous overland journey had to be made across Central Africa. An experimental air service was then started by Africair

This "Flight" compilation of fatal accidents involving the world's airlines in 1958 (see col. 2) shows that the total loss of life in some 50 accidents amounted to over 800. A subsequent analysis will relate these accidents to the circumstances of each flight

Month	North America	Latin America	Europe	Elsewhere
January		TAM —— 1		
February		Loide DC-4 5	BEA Elizabethan ... 21 KLM DC-6B ... ... 1 Manx B-170 35	RAI Catalina 15
March	Braniff DC-7C ... 9			Misrair Viking ... 8 IAC DC-3 20
April	Capitol Viscount ... 47 United DC-7 46	AREA DC-3 ... ... 32 TAO Ju 52 ... ... 3 TAP L-13 1	Skyways Hermes ... 3 Aviaco Heron ... 16	
May	Capitol Viscount ... 11	SAP DC-3 4	BEA DC-3 ... ... 3 Sabena DC-7C ... 65 Dansir York ... ... 4 Air France DC-3 ... 14	PIA CV-240 20
June	Capitol DC-3 ... ... 1 Reeve C-46 2	Aeronaves L.749 ... 45 Cruzeiro CV-440 ... 19		IAC DC-3 ... ... 4 Adastra L.14 3
July				IAC DC-3 3
August	N'East CV-240 ... 23 Al. Coast —— ... 1	Loide DC-4 10	KLM L.1049 99	CAAC Viscount ... 36 All Nippon DC-3 ... 33
September	F. Tiger L.1049 ... 8 Austin Norseman ... 1	Loide C-46 ... ... 13 TAP L-13 ... ... 2 Aeronorte Cessna 180 3	Independent Viking ... 3	WAAC Dove ... 4 MEA York 5
October		LAV L.1049 24	BEA Viscount 31	
November	Capitol C-46 2	Cubana Viscount ... 17	Artop Mariner ... 36	Yemen DC-3 8
December		VASP Scandia ... 21	HCA Viscount ... 6 Aviaco Languedoc ... 21 BOAC Britannia ... 9 UAT DC-6B 3	

AIR COMMERCE...

and in 1954 this was taken over by W.N.L.A. Traffic on this service has steadily expanded and last year reached the record figure of 87,900, bringing the total number of passengers carried since the operation's inception to 340,000. This volume of traffic requires the full-time operation of eight DC-3s and one DC-4.

As rail services are adequate between Johannesburg and Bechuanaland it was decided to base the air operation at Francistown. From this point Wenela's services fan out northwards to outlying points in the Protectorate, to Northern Rhodesia and Nyasaland, and to the Caprivi Strip, that remote corner of South West Africa which thrusts eastwards between Northern Rhodesia and Bechuanaland.

K.L.M.'s RIGHTS AT SINGAPORE

THE Netherlands Government last week expressed "great disappointment" when the United Kingdom advised them that K.L.M.'s twice-weekly flights to Singapore would henceforth have to be reduced to a once-weekly frequency. This, said the Dutch, was "neither in accordance with the progressive character of modern civil aviation nor with the demands of the travelling public."

In December 1957 the United Kingdom granted K.L.M. temporary permission to make Singapore their Far East terminal following the rejection by the Indonesian Government of the company's traffic rights in Djakarta. The Dutch airline was, at that time, able to land three times a week and large numbers of Dutch nationals were evacuated from Indonesia through Singapore. According to *The Times* the Dutch argument has been that B.O.A.C. have not lost on balance, since they could acquire a share of the former Dutch traffic to Indonesia.

The British note took the form of a personal message from the Prime Minister to Dr. Luns, the Netherlands Foreign Minister. Dutch newspapers have been describing Britain's actions as "not fair play" and "unable to be defended by any reasonable argument."

An agreement between Rotol Inc. (the British firm's U.S. subsidiary) and General Electric's aircraft service division was signed last week. It provides for the overhaul of Rotol equipment in the U.S.A. On the left is Mr. Jack Staples of Rotol Inc., and on the right is Mr. James E. Schwartz of General Electric

1958 ACCIDENT RECORD

STATISTICIANS may find cold comfort in the trend of airline safety records: although the fatality rate was as favourable as ever before (see *Flight*, January 2), the fact remains that the number of individual fatalities climbed to an all-time record.

No organization is responsible for publishing complete records of airline accidents on an international basis (the I.C.A.O. accident digests present details on the basis of member-States rather than individual carriers). A surprisingly large number of accidents manage to escape notice in the Press, others are widely misreported. Bearing in mind such possibilities of error, the table above has been drawn up to present a tentative picture of the number of fatal accidents involving the world's airlines in 1958. Loss of life by third parties has been excluded, the figures showing only the reported fatalities among passengers and crews. All operators, scheduled or non-scheduled, have been covered and account has been taken of fatal accidents on all types of service—scheduled, charter or non-revenue.

Footnote: The first serious accident of 1959—and the first fatal accident for the airline concerned—occurred at Rio de Janeiro on January 11. A Super Constellation of Lufthansa crashed at Rio de Janeiro, reportedly while landing. Of the 39 people on board only three survived, including, it is reported, the co-pilot.

DIFFERENTIAL DIFFERENCES WIDEN

THE I.A.T.A. Traffic Conference meeting which was to have taken place on January 20 in Paris—to resume the talks at Cannes which were abandoned last September—has been postponed. It is hoped that, as a result of further behind-the-scenes talks and exchanges of correspondence, it may be possible to hold the meeting in mid-February.

It appears from the discussions which have gone on unceasingly since Cannes that Alitalia are as determined as ever on a jet surcharge, the "unfair penalty" which is being opposed, also with undiminished determination, by Pan American and B.O.A.C. (though not, it is reported, by T.W.A.).

At the I.A.T.A. annual general meeting in Delhi last October an attempt was made at top airline levels to propose some compromise agreement which might smooth the resumed Cannes deliberations. It is reported that one of these compromises was the possibility that economy-class travel might be the preserve of the propeller airliners. Whether or not this story is true—all I.A.T.A. fares discussions are secret—it seems to the onlooker to promise at least some possibility of acceptance. It would, in effect, represent not a jet surcharge, but a propeller discount, and it might therefore be acceptable to both sides.

There are, however, two snags to any such compromise. An arrangement whereby economy-class travel—which is already the predominant form of business on the North Atlantic—was reserved to propeller airliners could last only so long as there was a shortage of jet capacity—that is to say, during the course of this year's summer season. As soon as the jets are in full service next year their operation could only be fully justified by the carriage of economy-class passengers. Thus the short-term nature of the

Ask desk attendant for pp 111–112 Located in H.C.

On the Fokker Friendship line at Schiphol can now be seen two of T.A.A.'s first aircraft. Up to last week four Fokker and 17 Fairchild-built Friendships were in regular airline service, having flown a total of more than 4,150 hours

reported compromise is one snag; the other is that the American Civil Aeronautics Board, though having no strong views one way or the other on the principle of a fare differential between aircraft types, have said that they will not accept any agreement which excludes the jet from any particular class of service.

But it may well be that the C.A.B. will revise this particular decree to avoid a breakdown of the I.A.T.A. machinery, just as they revised (at the very last minute) their 1957 stipulation that economy-class fares should be 20 per cent lower than tourist-class. In the end, it will be recalled, I.A.T.A. compromised on an economy-class fare which was 20 per cent less than an *increased* tourist-class fare, the net difference being only 13 per cent. Admittedly that was less of a climb-down for the C.A.B. than would be expected of them now. But the survival of I.A.T.A.'s fare machinery is at stake.

Whatever the outcome of the controversy, which has to be settled by March 31 (when Government approval of existing fares ends), the airlines have little time left in which to prepare their summer fares promotional campaign.

BLEAK OCTOBER

STATISTICS by the M.T.C.A. for last October, recently issued, are as depressing as any for 1958. Traffic on all British scheduled services fell by 4 per cent compared with October 1957, while capacity increased by 2 per cent. Contributing to this unhappy state of affairs was the strike by B.O.A.C. engineers. Provisional November figures are slightly less depressing: capacity rose by 5 per cent while loads were up 1 per cent.

B.O.A.C. capacity and loads in October dropped by 6 and 12 per cent respectively. B.E.A., in contrast, managed to increase traffic by 12 per cent although capacity increased even more rapidly, by 21 per cent. But the most heartening results were experienced by the independents: traffic on their scheduled services increased by 14 per cent at a time when capacity was up by only 10 per cent.

The Ministry's airport statistics for October reflect the improvement in short-haul traffic: total number of passengers at British airports rose by 7 per cent. But most of this improvement was concentrated on London, where passenger traffic increased by 13 per cent. Traffic at other U.K. airports was static, while the Channel Islands suffered a fall of 7 per cent.

B.O.A.C.'s COMET RESULTS—

THE B.O.A.C. Comet 4 fleet, of which six out of 19 have now been delivered, appears to be giving a good account of itself. According to *B.O.A.C. News*, services have been virtually sold out to date. Load factors of more than 80 per cent can be assumed from the fact that, up to December 31, Comets had carried 3,913 passengers.

To meet the heavy demand for *de luxe* class seats, the number of these is being increased. Services started with 32 first-class and 16 *de luxe* class; the latter will now be increased to 20.

The newspaper *B.O.A.C. News* is a new internal broadsheet. Mr. Basil Smallpeice, B.O.A.C.'s managing director, introduces it on the front page as follows: "I hope that by keeping everyone more in the picture about what we are doing, and why, we will do much to promote a better sense of common purpose and better team spirit throughout the Corporation."

—AND THE ORDER FOR DECCA

THE announcement that B.O.A.C. have placed a firm order for Decca/Dectra for its North Atlantic Comet 4 fleet, briefly reported last week, comes at a critical moment in international air navigation affairs. Next month, on February 10, a special meeting of the I.C.A.O. Communications Division is to attempt to resolve the differences between the two rival national claimants —Decca and Vortac.

Though the argument is essentially about an internationally agreed short-range aid, B.O.A.C.'s order for Decca/Dectra to be installed in its North Atlantic Comets—the first such airline order for Dectra—is further evidence of British backing for the basic Decca system. Meanwhile, a Comet 2E has embarked on a series of Decca/Dectra demonstration flights in Europe and North America as an overture to the I.C.A.O. meeting, and no doubt as a counterbalance to the American VOR symposium held in America last year.

Last week the *Daily Express* aired the controversy in an article of which the keynote was "Ugly Salesmanship." The newspaper reported that the American Government, in an effort to diminish the influence of Decca, has refused permission to ships entering the Port of New York to use the existing Decca chain. The article alleged also that certain airlines in Europe have been told by the Americans that "whatever may be decided internationally, Vortac will be used in the U.S.A.," thus committing airlines to American Vortac equipment regardless of any international agreement to the contrary. It is also said that the Americans are paying the expenses of "numerous small nations, which would otherwise not attend the I.C.A.O. Montreal meeting, to back [America] with pro-American votes."

The *Daily Express* suggests that the Americans know Decca to be superior to Vortac, and the article refers to the favourable airline [Pan American] test-report on Dectra. The Americans know, it is said, that Decca/Dectra is much cheaper than Vortac and they are anxious to "prevent a Congressional inquiry into comparative costs and performance." It is said also that the American Government has already invested $600 million in Vortac. The article quotes a confidential memorandum from the Air Transport Association of America: "The large U.S. investment in the Vortac programme has the Government running scared." It is also said that Greece, Turkey, Italy and Iceland have been persuaded by the Americans to accept Loran C installations as part of the NATO defence programme, paid for by the U.S. Government. Loran C, like Decca/Dectra, is a low-frequency hyperbolic system, though it is not yet operational. This suggests some weakness in the American technical argument.

It seems that the Americans have already prejudged the issue by virtually disassociating themselves from a stated I.C.A.O. preference for hyperbolic systems, and declaring unilaterally that they would not be bound by any decision standardizing such a system, or even that they would take part officially in further discussion on the subject.

They are concerned about the technical shortcomings of VOR and Vortac, though these are disregarded officially. They object to Decca, but apparently propose another hyperbolic system which they admit is technically a tougher nut to crack. Above all, they are nervously but steadfastly supporting a $600m investment in VOR and Vortac. Even setting aside Decca, they have a weird problem to solve.

AIR COMMERCE . . .

VICTORIAN DEMISE

SOUTHERN AIRLINES have for the past four years been operating non-subsidized local services from their base at Melbourne. Early last year two Herons were acquired, and it seemed that a period of expansion was under way. But traffic failed to reach expectations—the business recession and improvement in surface transport have affected Australian airlines generally—and a subsidy was sought from the Federal Government. As this appeal was unsuccessful the airline decided to suspend operations and sell their equipment.

A feature of the company was the employment of hostesses as radio-officers: the flying staff includes five women, all qualified. Senior among them is Mrs. Beth Garrett, who was the first woman to obtain her licence as an airline pilot in Australia. As no other Australian airline employs women cockpit crew, the future of this group is uncertain.

Mr. J. J. Furniss has been appointed Director of Civil Aviation in East Africa. Mr. Furniss joined the directorate as Chief Telecommunications Officer in 1947 and became Assistant Director of Civil Aviation in 1955

A COSTLY STRIKE

IT is not difficult to imagine the disappointment of Eastern Air Lines' management at the present time. Two months ago Eastern were looking forward to introducing Electras on the New York - Miami route in time to scoop the Christmas holiday traffic from Northeast and National. Eastern were about to introduce a new and competitive aircraft on to America's richest holiday route, and no doubt Capt. Eddie Rickenbacker—president of Eastern—was rubbing his hands in gleeful anticipation.

Then came the announcement of an arrangement between Pan American and National whereby the last-named airline would operate Boeing 707 jet airliners leased from PanAm on the New York - Miami route. This announcement threatened Eastern's hopes that the market would flock to the Electra, and Eastern fought hard against C.A.B. approval of the PanAm-National arrangement. They did not succeed, and on the due date, December 10, National inaugurated jet services. But Eastern were in other trouble, too. Towards the end of November, their services were grounded by a strike of flight engineers over the "third-man-in-the-cockpit" issue. The dispute has now been settled, but Eastern must be bitterly disappointed by this double blow to their hopes.

The handing-over of the first Pakistan International Airlines Viscount 810, reported last week, was the occasion for this pleasant ceremony. Accepting a bouquet from Matthew Blackburn, 3½ years old (the same age as P.I.A.), is Mrs. Jamall, wife of the airline's engineering manager. Others, l. to r., are: Mr. T. Gammon, deputy managing director of Vickers-Armstrongs (Aircraft); Mr. M. Ikramullah, Pakistan High Commissioner in London; and Begum Ikramullah

AMERICAN A.T.C. DEVELOPMENTS

THE determined way in which the Americans are improving their air traffic control facilities is impressive. Here is a résumé of the progress made to date.

Operational testing of many elements of the new automatic traffic control systems is to be largely concentrated at a large establishment at Atlantic City, called National Aviation Facilities Experimental Center (N.A.F.E.C.).

Overall control is vested in the Bureau of Research and Development, which superseded the Airways Modernization Board on November 1. The B.R.D. is a part of the new Federal Aviation Agency, now headed by Mr. E. R. Quesada who was formerly head of A.M.B.

The B.R.D. will also take over the work of the C.A.A. Technical Development Center at Indianapolis, and this establishment will either be closed down or turned over to other work.

The result of this and other recent reshufflings is that both simulated and actual traffic-control development work will be concentrated at Atlantic City, near the first S.A.G.E. centre set up by the U.S.A.F. and now working at Kingston, N.Y. Thus is recognized the importance of co-ordinating civil and military aircraft movements and control. It is claimed that such co-operation will considerably hasten the evolution of a comprehensive system.

Next year's budget for the development of new traffic-control systems will be substantially the same as this year's $31.5 million. This figure—equivalent to about £11m—gives some idea of the scale of the effort being applied.

General Precision Laboratory holds a substantial contract to develop a Data Processing Central which will electronically process position reports and traffic flow and present them in visual form. An appropriate simulator is being prepared by Aircraft Armaments, Inc.

The Central is divided into terminal, transitional and *en route* portions, the first two of which will initially only be tested with the simulator. The last-mentioned will also be assessed under "live" conditions. For this purpose several sectors of the present Air Route Traffic Control Center based at New York International are to be moved to Atlantic City. About 150 controllers and nine sectors including one high-altitude, three oceanic, four low-altitude sectors and one Aircraft Movement Identification System will go to Atlantic City. The A.M.I.S. processes flight-plans of Air Defense Command aircraft. Terminal portions of the A.R.T.C.C. will remain in New York.

After simulated trials and evaluation the terminal and transition portions of the Data Processing Central will be installed for "live" tests at Idlewild, Suffolk County A.F.B. and Westchester County airport. It has been stated that a complete Central will be set up at New York, the most crowded air traffic area in the world, by January 1, 1963.

In the meantime, radar surveillance is being applied to civil traffic above 24,000ft as a means of avoiding collision. The north-eastern air routes out of New York used by the trans-Atlantic jet airliners have been so covered since commercial services began. Surveillance consists of advisory and vectoring service provided by joint civil-military teams at air defense centers. Jet airliners are watched from take-off to landing although, below 24,000ft, they follow normal airways.

Now the high altitude surveillance service has been extended to the two main VOR/Vortac air routes from New York to Miami, coinciding with the first civil jet service between these points.

Following another line of development, the F.A.A. Bureau of Research and Development has placed a $381,800 contract with the General Railway Signal Co., and with the Industrial Electronic Products Division of R.C.A. for an experimental "taxying and routing of aircraft co-ordination equipment" (TRACE) which is to be delivered by next August. The purpose of TRACE is to evaluate a non-radar system for regulating airport-surface movements.

It is claimed that present radars for this purpose do not provide sufficient information on traffic flow and handling capacity. This particular new equipment will employ a series of magnetic-loop sensers set in runways and taxiways to transmit signals to a control position when aircraft pass over them. Up to 20 simultaneous aircraft movements, with landing speeds up to 170 kt and taxying speeds up to 60 kt, are allowed for. First trials will be intended to assess the efficacy and to find the best layout of the system before going on to attempt automatic programming of movements and evolving a system of visual guidance for pilots while taxying. Work on TRACE and AGACS and other systems will be closely co-ordinated with development of the data processing system for traffic control services as a whole.

BREVITIES

Cambrian Airways' services this summer are likely to be operated by DC-3s leased from B.E.A. Cambrian's Herons and DC-3s are reported to be for sale.

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During the first half of this year at least 1,000 emigrants are expected to take advantage of the subsidized £10 fare for flying from U.K. to Australia.

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Preliminary discussions have been completed between the M.T.C.A. and the East African High Commission regarding the provision of financial aid for ground services within East Africa.

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Air Research Bureau statistics reveal that Viscounts carried one-third of all intra-European air traffic last summer. Total traffic was up by 8 per cent but capacity increased by 20 per cent, load factor falling from 62 to 56 per cent.

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Capital Airlines are paying $25,405 per month, $10.50 per engine hour and $3.64 per airframe hour for the three Viscount 812s which they have leased from Continental Air Lines for operation on their newly awarded route to Florida. Capital are responsible for maintenance and insurance.

* * *

A new Dutch company, Lucht Transport Unie, based at Rotterdam, has been formed to operate holiday flights within Europe. It will co-operate closely with the German concern Luft-transport Unternehmen. There may be significance in the fact that the initials of each company, L.T.U., are the same.

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Seaboard and Western may acquire 25 per cent of the shares of Irish Air Lines. According to Mr. James Gorman, secretary of the airline, C.A.B. approval may be granted before May. The deal would provide the Irish carrier with a further £500,000 capital. It will be recalled that Irish Air Lines operate transatlantic services with Super Constellations leased from Seaboard. The purchase of jets is being considered.

D.H. Herons of Silver City's Northern Division will inaugurate a new scheduled service from Blackpool to Dublin in the spring.

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A new Chilean carrier, Linea Aerea Del Cobre, has recently inaugurated DC-3 services from Santiago.

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The United States Government have rejected a second Belgian request for additional Sabena traffic rights in America.

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East German sources report that the flight trials of the BB.152 jet airliner have been successful to date, and that "firm orders" have been received from "several socialist countries."

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The adjourned inquest concerning the B.O.A.C. Britannia 312 accident on a non-revenue flight near Christchurch on Christmas Eve will be re-opened on January 27 at Christchurch.

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Following the dispute last October between the Italian and American governments on the question of PanAm jet traffic rights in Rome—a dispute which had its roots in the jet-fare controversy—comes news that the Italians have been awarded an additional traffic point in the U.S.A.

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The president of Aerolineas Argentinas, A. Cdre. Juan Jose Guiraldes, has said that his airline's economic problems would be solved if the company received half of the £10 million spent annually on air travel in and out of Buenos Aires. Instead of that, he is reported to have said, foreign airlines absorbed almost the entire amount.

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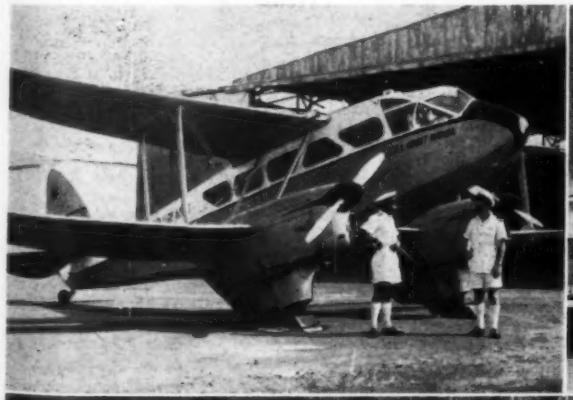
Both B.E.A. and B.O.A.C. have ordered the Ferranti FH7B standby artificial horizon for the Vanguard and Comet. The instrument has full roll freedom and is driven by a 115V, 400 c/s supply, but can automatically change over to a 21 to 29V D.C. supply converted to A.C. by a transistorized static invertor housed in a separate container, together with a transistorized fast-erection invertor controlled from a button in the rim of the instrument dial.

SHORT-HAUL IN SIERRA LEONE

With an average stage-length of under 50 miles, Sierra Leone Airways must claim to be included among the really short-haul carriers of this world. (The title for the shortest average stage is believed to be held by Woods Airways: their only service covers the 26-mile route between Perth, Australia, and Rottnest Island.) S.L.A.'s three Rapides are now operating regular services from Hastings—the local airport for the colony's capital, Freetown—to the international airport at Lungi; inland to Bo, Kenema and Daru; and southwards along the coast to Port Loko and Magburaka. S.L.A. have, since their inception a year ago, been managed by Nigerian Airways. The four pictures below were taken at th eir Lungi base



SERVICE AVIATION

Royal Air Forces and Naval Flying News

A Chipmunk of No. 114 (Hong Kong) Sqn. seen from an accompanying aircraft during a patrol over Kyrenia. The squadron, which was disbanded at Nicosia in December 1957 when equipped with Valettas, was recently re-formed to take part in security duties in Cyprus

Sir Dermot's Tour

PILOTING a Canberra B.6 of No. 9 Sqn. the Chief of the Air Staff, Marshal of the R.A.F. Sir Dermot Boyle, left the U.K. on January 10 for a 20,000-mile tour of Royal Air Force units overseas. His itinerary includes Aden, Bahrain, Cyprus, Gibraltar, Kenya, Malta, Malaya and Singapore; and Sir Dermot is also due to pay official calls in Bangkok, Colombo, New Delhi, Karachi, Khartoum and Salisbury, where he is making overnight stops. His return to the U.K. is scheduled for Sunday, February 1.

With the C.A.S. are two members of No. 139 (Jamaica) Sqn., F/L. M. G. Thomas as A.D.C. and co-pilot and F/L. K. Hankinson as navigator. Another Canberra B.6 of No. 9 Sqn. is also making the trip, again with a No. 139 Sqn. crew, S/L. R. M. Jenkins as captain and F/L. D. E. Lakin as navigator. This aircraft also has aboard two fitters, F/Sgts. A. Hopkins and J. M. Harris.

Augmenting Transport Command

IT was announced last week that the Minister of Defence had authorised an expansion in the carrying capacity of R.A.F. Transport Command, in fulfilment of the Government's policy of increasing the mobility of the armed forces, and that accordingly it was proposed to adopt a military version of the Armstrong Whitworth Type 650 Freighter.

Commenting on this statement the managing director of the Hawker Siddeley Group, Sir Roy Dobson, said that everybody who had the good of the R.A.F. at heart would be delighted at the Government's decision to strengthen Transport Command. He added: "We, of course, are very pleased that our private venture Armstrong Whitworth Argosy has been chosen for this job. . . . It's going to be a fine aircraft with great potential development."

The number of A.W.A. 660s to be ordered for the R.A.F. has not been disclosed.

[Reference is made to this development in a leading article on p. 85.]

Polar Expert

FORMERLY in command of the Royal Air Force unit at the R.A.E. Farnborough, before taking last year's Imperial Defence College course, G/C. D. C. McKinley has recently become Director of Operational Requirements (C) at Air Ministry with the acting rank of air commodore. He captained the Lancaster *Aries I* on the first exploratory flight by the R.A.F. to the North Pole, in May 1945, and later that month flew from the Yukon to R.A.F. Shawbury via the North Magnetic Pole. In September that year he received a Bar to the A.F.C., having won the D.F.C. in 1940. He is also a C.B.E.

R.A.F. Postings

AMONG new R.A.F. appointments which have recently been announced by Air Ministry are the following:—

Wing Commanders C. H. Baker to command the R.A.F. Regiment (Malaya); N. J. Carver to R.A.F. Ballykelly, to command No. 210 Sqn.; A. G. Clennett to H.Q., Maintenance Command, for technical staff duties; H. Drake to R.A.F. Kinloss, for technical duties; D. J. Griffiths to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; L. L. Harland to R.A.F. Valley, to command No. 1 Guided Weapons Trials Sqn.; R. G. Knott to Air Ministry, for duty in the Department of the C.A.S.; T. McGreevy to the Ministry of Supply; E. K. Paine to Air Ministry, for duty in the Department of the C.A.S.; J. W. Sim to H.Q., Technical Training Command, for administrative staff duties; A. Vicary to be P.S.O. to the Inspector-General, R.A.F.; J. A. Bush to R.A.F. Lindholme, as O.C. the flying wing and training; C. C. Calder to R.A.F. Waddington, for instructor duties; K. C. Giddings to R.A.F. Honington, to command No. 57 Sqn.; H. B. Hunt to H.Q., Bomber Command, to command the Operations Centre; K. F. W. Tapper to the R.A.F. Staff College, Andover, for directing staff duties.

No. 256 Sqn. Reunion

ON Friday, April 17, No. 256 Sqn. is holding its first reunion dinner. The venue is the R.A.F. Club (128 Piccadilly, London, W.1) and it is hoped that as many present and former members as possible will attend. Applications for tickets (30s each, inclusive of wines) should be made before March 12 to the following address: "256 Reunion," 149 Mortlake Road, Richmond, Surrey. Cheques (crossed) should be payable to "256 Reunion Account."

IN BRIEF

The R.A.F. Benevolent Fund has received £5,206 as a result of the *Week's Good Cause* appeal broadcast by Sir Archibald McIndoe during Battle of Britain Week.

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The commanding officer of No. 24 (Commonwealth) Sqn., S/L. D. W. Hitchins, A.F.C., has been promoted wing commander in the R.A.A.F. promotions announced at New Year.

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Among badges recently approved by the Queen for R.A.F. stations is one for North Coates, described in heraldic parlance as "In front of a ray of lightning in bend a ballista" (an ancient weapon of bombardment), and with the motto "Guide to attack."

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This year's R.A.F. Reserves Club Ball is being held at the Dorchester Hotel, Park Lane, London, W.1, on Wednesday, February 25. Tickets (37s 6d) and table reservations are available from the Secretary, R.A.F. Reserves Club, 14 South Street, London, W.1 (tel. Grosvenor 1738).

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The Pakistan Air Force Staff College, of which A. Cdre. C. B. E. Burt-Andrews is Commandant, was opened at Karachi on January 5 by the Pakistan president, General Mohammed Ayub Khan. Air Marshal Sir Richard Atcherley, a former C-in-C. of the Pakistan Air Force, was present at the ceremony.

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Vice-Admiral Sir Manley Power, the Fifth Sea Lord, is visiting the Royal Naval Schoolboys Exhibition at Selfridges store in London next Monday (January 19) at 12.30 p.m., and at the same time on the following day the visiting V.I.P. will be Rear Admiral C. L. G. Evans, whose new appointment as Flag Officer Aircraft Carriers was recently announced.

Air Chief Marshal Sir Thomas Pike, the A.O.C-in-C. Fighter Command (right), receiving the silver model of a Lightning presented to the Command recently as a gift from the English Electric Co. Making the presentation at Marconi House, Strand, is the company chairman, Sir George Nelson

MOONLIGHT